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ROYAL BOTANIC GARDENS, KEW.

VII.—HYDNOCARPUS AND TARAKTOGENOS IN THE FEDERATED MALAY STATES.

On the publication of the previous article on this subject (*K.B.* 1926, p. 17) our attention was drawn by Mr. A. S. Haynes, now British Adviser, Kedah, to the experiments that are being conducted at the Serdang Plantation of the Agricultural Department, Federated Malay States. We are indebted to Mr. B. W. Elles, the present Secretary for Agriculture, Straits Settlements and Federated Malay States, who has kindly sent the following account of the work that is being carried out there on species yielding Chaulmoogra Oil.

NOTES ON HYDNOCARPUS SPECIES UNDER CULTIVATION AT THE EXPERIMENTAL STATION, SERDANG, F.M.S.

B. Bunting and J. N. Milsum

In October, 1920, Dr. J. F. Rock, while on a visit to Kuala Lumpur, presented to the Department of Agriculture a parcel of seeds of *Hydnocarpus anthelmintica*, which he stated were obtained from trees growing in the streets of Bangkok (see U.S. Dep. Agric. Bull. No. 1057, p. 11). These seeds were planted at the Experimental Plantation, Kuala Lumpur, but were subsequently transferred to the Government Plantation at Serdang, which was then being opened up. From then onwards, several consignments of seeds of *Hydnocarpus spp.* have been received at Serdang and the object of these notes is to record the behaviour of the trees under cultivation, together with data collected during this period.

The planting programme at the Experimental Plantation, Serdang, provides for an area of 25 acres to be planted up with each of the following species:—*Hydnocarpus anthelmintica*, *H. Wightiana* and *Taraktogenos Kurzii*.

Hydnocarpus anthelmintica Pierre.

As previously stated, the seeds of this species were obtained from roadside trees at Bangkok, Siam. A number of seedlings were received at Serdang during February, 1922. Owing to suitable cleared land being unavailable, it was not found possible to plant out the young trees until May, 1923, when they averaged 2 feet high. The area selected for planting was on sloping land, facing west, in the arboretum. The soil is well drained, somewhat loose and

overlying laterite. Forty-eight trees were planted at a distance of 30 feet by 30 feet, triangular. This number was subsequently increased to 55, making an acre planted with this species.

The following table shows the rate of growth of the original forty-eight trees. It should be noted that, owing to the reason stated, considerable time was lost between germination of the seeds and final planting in the field.

Table 1
Rate of Growth of *Hydnocarpus anthelmintica* at Serdang.

Date.		Average Height		Increase in Height over 12 months
June, 1923	...	2 feet 1 inch	...	—
„ 1924	...	5 „ 6 „	...	3 feet 5 inches
„ 1925	...	10 „ 1 „	...	4 „ 7 „
„ 1926	...	16 „ 6 „	...	6 „ 5 „

In addition to the trees in the arboretum, one of the Plantation roads was planted up with 50 young trees to form an avenue. The seedlings had been in the nursery beds for some time and when planted out early in June, 1923, averaged 7 feet in height. They were cut back to within 3 feet from the ground after planting. The distance between the trees in the rows is 33 feet and the space across the road from tree to tree is 32 feet; the planting arrangement being triangular. These trees are backward as compared with those in the arboretum, owing to the somewhat severe treatment they received at the outset. In October, 1926, the average height of the trees was 12 feet 6 inches. No sign of flowering has so far been observed.

Late in 1925 flower buds were observed on several of the largest trees in the arboretum. Only male flowers were noticed at first, but early in January, 1926, flowers of both sexes were noted, followed by the setting of a few fruits on three trees only. A number of the earliest fruits noticed failed to mature and dropped from the trees.

The flowers are unisexual and produced in short axillary cymes. They are pendulous, light green with a pink eye, very fragrant, and though small, attractive in outline. The female flower is larger than the male, the scales being broader. They appear in less abundance than the male flowers.

About thirty fruits have set on the three trees and of these twelve show signs of maturity. The first ripe fruit fell during October, 1926, and weighed 13½ ounces. It measured 3½ inches in diameter and about 3¾ inches in length. The fruit is globular in shape with a brownish tomentum in the young stage, hardening upon ripening to form a strong hard woody shell, rusty brown in

colour. The fruit broke in falling and embedded in the cream-like pulp were 18 seeds. The seeds on being cleaned were found to be of somewhat irregular shape, almost an inch long and $\frac{3}{4}$ inch



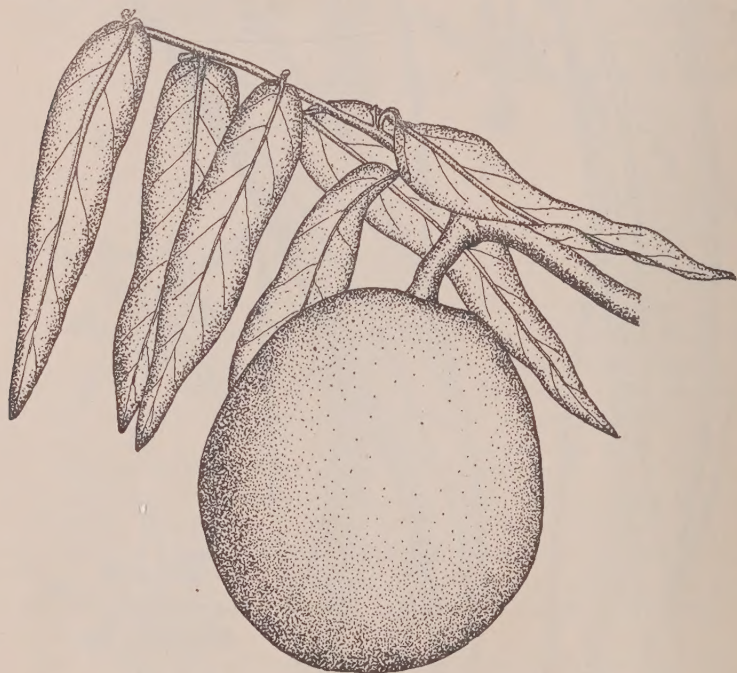
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Hydnocarpus anthelmintica.

1. Branch with male flower (nat. size). 2. Male flower.
3. Female flower. 2 and 3 enlarged.

broad. The seed coat is hard and a dirty grayish brown in colour. These seeds have been planted and their power of germination will be carefully recorded.

Measurements of other fruit removed from the trees show dimensions as much as 4 inches in diameter and 4 inches in length. The fruits agree well in appearance with Dr. Rock's photograph published as Plate 11 in U.S. Dep. Agric. Bull. No. 1057, already referred to.



Hydnocarpus anthelmintica.
Fruit matured at Serdang ($\times \frac{1}{2}$).

To summarize the position regarding the species, *H. anthelmintica*, it may be stated that 100 trees are established at the Plantation and that the first fruit has ripened within 6 years from sowing the seed. It is to be noted that some delay occurred in planting out these trees in the field and should such trees be allowed to make uninterrupted growth from time of germination, it is possible that they would reach the producing stage much earlier. The tree appears to grow well under local conditions, as would be expected of a tropical rain forest species, and has not yet shown signs of being attacked by insect pests or fungoid diseases.

Hydnocarpus Wightiana Blume.

The source of supply of seeds of this tree was the Bombay Presidency.

Mr. M. S. Tuggerse, Divisional Forest Officer, Honavar, Kanara, who sent the seed, supplied the following notes under cover of his letter of the 13th September, 1924.

"This is a large-sized ever-green tree growing in the rain tract of the West Coast of Kanara (Bombay), where the rainfall is from 120 to 200 inches per annum, chiefly falling between June and October. Trees of 10 to 12 feet girth with a crown spreading over 400 sq. yards of area are not uncommon. Isolated trees growing in the open often attain this size, though the stems get fluted. Trees grown mixed in the forests usually attain a great height, often from 60 feet to 80 feet, with a thin clean bole, but under such conditions the development of the crown is not great and the production of seed is naturally very limited.

"Where the object is the production of a maximum quantity of fruit per tree, planting should be done well apart. I recommend 40 trees to the acre, i.e., 33 feet by 33 feet. But the clearing of the original forest (where such has to be done for concentrated planting of a given species) would cost much and a long period would elapse before the trees attain their maximum crown development. It would, therefore, be best to plant $16\frac{1}{2}$ feet by $16\frac{1}{2}$ feet, i.e., 160 to the acre, in squares at the beginning, and to thin out the intervening trees later on, and to grow catch crops in the meantime.

"Fresh seed may be sown direct 'in situ.' For this, dig large holes 3 feet by 3 feet, refill the soil and sow 2 or 3 seeds. If more than one seed germinates pull out the rest but keep one good plant after they have grown about a foot high. Where direct sowing is not possible, raise the plants in a nursery and plant out when they are 6 to 12 ins. high. For successful results in transplanting, basket- or pot-planting is good. Seed germinates in about fifteen days after sowing.

"In Kanara the tree is found on deep alluvial deposits by the side of perennial fresh water rivulets (nallas). They also grow on mooram soils and laterite, from the sea level to 1,800 feet elevation.

"To encourage the trees to grow a large crown it is best to undertake thumb-nail pruning when the plant attains a height of about 6 feet to 8 feet; later on, training of branches must be done patiently and perseveringly. This is a markedly sun-loving tree, i.e., light demander, as most of the trees in the tropics are. For the production of fruit, sunlight is necessary, also a spreading crown.

"It appears that the tree lives to a great age under favourable conditions of soil, but trees bear fewer and fewer fruits as they grow older. In order that an old tree may be rejuvenated, lop out all smaller branches and the tree will begin to bear in the second year after pollarding. Trees that attain a maximum development may yield up to 1 cwt. of clean seed."

The first consignment of 2,000 seeds was received in October, 1924, but though given careful treatment they failed to germinate.

The seeds were dug up and examined in March of the following year and all were found to be decayed. Two further consignments of about 2,000 seeds each were received subsequently from Mr. M. S. Tuggerse, during July, 1925. In forwarding these seeds Mr. Tuggerse stated that they were collected in June, 1925, under his personal supervision. The seeds weighed 12 lbs. on arrival, giving an average of about 24 seeds to the ounce.

In addition to forwarding the seeds and notes regarding the cultivation of this tree, Mr. Tuggerse kindly forwarded specimens of mature fruits and a photograph of one of the trees from which the fruits had been collected. The fruits were found to contain an average of 20 seeds each.

The two consignments were planted on the 20th July, 1925, in several ways and gave an average germination capacity of 52 per cent. Germination commenced a month after sowing and continued for seven weeks, when the balance of seeds was found to be unsound.

The following data regarding the germination of the two consignments is recorded:—

Table 2

Method of Sowing	Consignment 1	Consignment 2
In nursery beds, under shade	76 per cent. ...	72 per cent.
In open nursery beds ...	60 „ „ ...	49 „ „

A certain number of seeds were planted in boxes of soil under shade. Only 28 per cent. germination was recorded, but this is thought to be due to allowing the soil in the boxes to become too dry.

It appears, therefore, that the seeds should be given moist conditions under shade to secure maximum germination. The seeds from the whole fruits were sown separately under shade and gave a germination capacity of 97 per cent. in eight weeks from sowing, which is considerably in excess of that from the seeds separated from the fruits.

The seedlings raised in boxes were subsequently transplanted into small bamboo baskets and this method of planting was found to be more satisfactory as compared with transplanting the young trees direct from nursery beds into the field, even though a good ball of soil was allowed to adhere to the roots. (See fig. p. 55.)

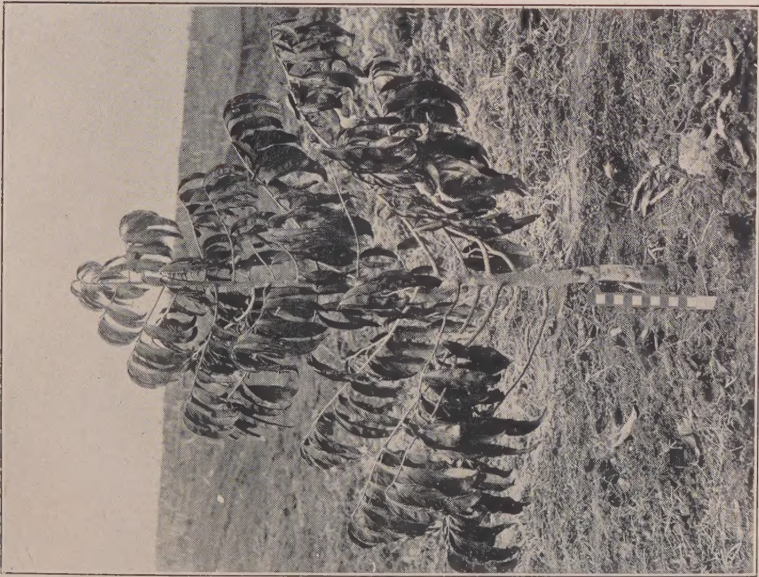
The area selected for planting this species was similar to that in the arboretum already described. An experimental planting of kapok (*Eriodendron anfractuosum*) had been undertaken on the land and it was necessary to devise a system of interplanting.

PLATE VII.



Hydnocarpus Wightiana.

Young tree 1 year from planting in the field. The scale is 1 ft.



Taraktogenos Kurzii.

Young tree 2½ years from planting in the field.
Height 7ft. 9ins.

PLATE VIII.



Fruiting *Hydnocarpus anthelmintica*; $3\frac{1}{2}$ years from planting in the field.

A commencement was made to plant up the area at the end of November, 1925, at a planting distance of 40 by 20 feet, rectangular, requiring 54 plants per acre, alternating lines of *H. Wightiana* being planted between the kapok. Approximately 25 acres were planted in this way, but as indicated above a number of the young plants died off during dry weather. These were subsequently supplied and the whole area, excepting some ravines, is now fully planted and the trees are growing well. The average height of these trees in October, 1926, was 2 feet 6 inches.

As in the case of *H. anthelmintica*, this species is being tested as a road-side tree and 50 trees were planted during May, 1926, on either side of one of the Plantation roads. The trees are planted in triangular fashion, the distance between the trees in the rows being 33 feet, the rows being 27 feet apart. The young trees are making good growth and in October, 1926, averaged 2 feet in height.

Though this species is not so far advanced on the Plantation as the previous one, a comparatively large area has been planted up and the trees are making rapid growth. Both species appear amenable to plantation conditions and are readily raised from seed.

Taraktogenos Kurzii King.

Six young trees labelled *Taraktogenos Kurzii* were received from the Botanic Gardens, Singapore, during August, 1923. Mr. R. E. Holttum in sending these plants stated that the seeds from which the trees were raised were obtained in the Upper Chindwin District, Upper Burma, by Dr. Rock and were received at Singapore in February, 1921.

The trees were planted out in the arboretum on rather low-lying land, during the latter part of May, 1924. The young trees then averaged 1 foot 10 inches in height. The heights of the trees have been recorded yearly and their growth is shown to be rather



Taraktogenos Kurzii.
Seedling three months old.

slow. In June, 1926, the height of the six trees varied from 2 feet 6 in. to 7 feet 9 in., averaging 5 feet. Two trees, however, have made comparatively good growth and it appears as if the soil conditions are not altogether suitable. So far no signs of flowering have been observed.

In June, 1926, a small parcel containing 32 seeds of this species was received from the Conservator of Forests, Utilization Circle, Burma. When forwarding the seeds the Conservator of Forests stated that they had been obtained by the Divisional Forest Officer, Thaunggin Division. The seeds were sown on the 26th June, 1926, and germination commenced a month later, continuing for three weeks. Fourteen seeds germinated in all, but actually only ten young plants were raised owing to damping off. These have been established in bamboo baskets and in October, 1926 averaged 7 inches in height, showing a pair of true leaves in addition to the cotyledons. The seedlings agree well in appearance with the illustration of the species on Plate XVI, in Bull. 1057 of the U.S.A. Department of Agriculture.

It will be seen that so far no very great progress has been made with this important tree. There appears, however, probability of obtaining further supplies of seed, and when these are forthcoming, it is anticipated that there should be no difficulty in planting up the proposed area according to the original planting programme.

The writers are indebted to Messrs. E. A. Curtler and J. Lambourne, Assistant Agriculturists at the Experimental Plantation, Serdang, who have jointly been in charge of the experimental records connected with the cultivation of the various species mentioned in this article.

VIII.—CONTRIBUTIONS TO THE FLORA OF SIAM* ADDITAMENTUM XX. W. G. CRAIB.

Indigofera pallida Craib [Leguminosae-Galegeae]; ab affini *I. Wightii* Graham, foliolis pro longitudine latioribus apice truncatis apiculatis recedit.

Frutex 60–90 cm. altus (ex *Kerr*); ramuli iuventute plus minusve angulati et sulcati, mox teretes et conspicue striati, pilis brevibus medifixis arcte adpressis persistentibus pro parte maxima albis paucis tantum brunneis tecti, primo cinerei, mox brunneo-cinerei. *Folia* (petiolo 10–15 mm. longo incluso) ad 8.5 cm. longa, et petiolo et rhachi supra canaliculatis indumento ei ramulorum simili tectis, stipulis parvis persistentibus; foliola usque ad 29, stricte opposita, saepissime elliptica vel obovato-elliptica, apice truncata, costa excurrente apiculata, basi late cuneata vel rotundata, matura saepissime 6.5 mm. longa et 4.5 mm. lata, sat rigida, pagina

* Continued from *K.B.* 1926, p. 363.

utraque pilis albis adpressis medifixis sed inferiore crassioribus sparsius tecta, petiolulo vix 1 mm. longo suffulta; stipellae petiolulis multo breviores. *Racemi* axillares, foliis saepissime breviores, pedunculo communi petiolo dimidio brevior suffulti, rhachi indumento ei ramulorum simili tecto; flores expansi haud visi; bracteae alabastris breviores, deciduae; pedicelli fructus maturi ad 2 mm. longi; calyx et corolla ante anthesin pilis adpressis medifixis albis densius tecti; filamenta persistentia, 4 mm. longa. *Legumen* ad 2.8 cm. longum et 3 mm. diametro, apiculatum, cinereum, pilis albis adpressis brevibus tectum, seminibus circa 12.

Lampang, 300 m., deciduous forest, *Kerr* 3083.

Millettia fallax Craib [Leguminosae-Galegeae]; a *M. Wrightiana* Prain, et *M. pubinervi* Kurz, filamento postico ab aliis libero et ovulis paucioribus recedit.

Arbor circa 8 m. alta (ex *Kerr*); ramuli primo crispatis fulvo-pubescentes, sulcati, mox glabri, cortice brunneo vel pallide brunneo obtecti, lenticellis vix conspicuis. *Folia* 5-7-foliolata, petiolo 2.5-3.2 cm. longo basi incrassato cum rhachi sparse crispatis fulvo-pubescente supra plus minusve canaliculato suffulta; stipulae deciduae; foliola opposita, oblongo-oblancoolata, rarius oblongo-lanceolata vel oblonga, apice acuminata, costa excurrente breviter apiculata, basi cuneata vel rotundato-cuneata, lateralia praesertim inferiora saepe parum inaequilateralia, 2.5-6 cm. longa, 1.6-2.6 cm. lata, chartacea vel rigide chartacea, sicco viridia, subtus parum pallidiora, supra sparse adpresse pubescentia, subtus ad costam nervosque laterales breviter fulvo-pubescentia et aliter pilis albis adpressis inconspicuis sparse instructa, nervis lateralibus utrinque 7-9 intra marginem ipsam anastomosantibus pagina utraque conspicuis vel fere prominulis, petiolulo circa 4 mm. longo supra parum canaliculato sparse breviter fulvo-pubescente suffulta; stipellae deficientes. *Racemi* axillares, solitarii vel gemini, saepe e nodis infra folia evoluta vel e ramulis omnino defoliatis orti, pedunculo communi ad 2.5 cm. longo incluso ad 10 cm. longi, pedunculo cum rhachi crispatis pubescente; flores viridi-albi (ex *Kerr*), fasciculati, nodis floriferis sessilibus; pedicelli 4 mm. longi, breviter adpresse pubescentes; bracteae 3 mm. longae, 1.5 mm. latae, deciduae; bracteolae 2, minutae, ad pedicelli apicem positae. *Calyx* circa 4 mm. longus, lobis posticis fere obsoletis, lateralibus et antico brevibus, extra sparse adpresse pubescens, sicco fuscescens. *Vexillum* ovato-rotundatum, apice parum emarginatum, basi subcordatum, bicallosum, ungui sat lato circa 1 mm. longo incluso 9.5 mm. longum, 8 mm. latum, glabrum; alae oblongae, basi latere uno rotundato-auriculatae, ungui 2 mm. longo incluso 9 mm. longae, 2.5 mm. latae, glabrae; carinae petala ungui 3 mm. longo incluso 9 mm. longa, 3 mm. lata, glabra. *Stamen* vexillare ab aliis omnino liberum, antheris oblongis. *Ovarium* adpresse pubescens, circa 4 mm. longum, stipite vix distincto, stylo glabro, ovulis 4. *Legumen* stramineo-brunneum,

styli basi persistente apiculatum, basi cuneatum, 8-9 cm. longum, ad 2.3 cm. latum, haud alatum, glabrum, pedicello 4 mm. longo suffultum; semina fusca, compressa, ambitu oblongo-elliptica, ad 1.5 cm. longa et 1 cm. lata, hilo parvo.

Prê, Den Chai, 150 m., *Kerr* 3163.

Millettia kangensis *Craib* [Leguminosae-Galegeae]; species floribus inter maiores cum foliis iuvenilibus orientibus, vexillo basi calloso extra sericeo, ovario pubescente distinguenda.

Arbor circa 10 m. alta (ex *Kerr*); ramuli iuventute densius breviter crispatim fulvo-pubescentes, mox glabri, cortice brunneo vel cinereo-brunneo obtecti, lenticellis numerosis prominentibus. *Folia* 7-9-foliolata, petiolo circa 4 cm. longo incluso circa 17 cm. longa, et petiolo et rhachi subteretibus vel hoc superne late canaliculato indumento ei ramulorum iuvenilium simili obtectis; stipulae lineares, circa 3 mm. longae; foliola opposita, oblonga, oblongo-ob lanceolata vel terminali obovato, apice breviter subito acuminata, summo apice costa excurrente apiculata, basi cuneata vel rotundato-cuneata, lateralalia saepissime parum inaequilateralialia, ad 8 cm. longa et 4.2 cm. lata, chartacea, supra primo sericea, mox adpresse pubescentia, subtus breviter molliter pubescentia, nervis lateralibus utrinque 8-10 supra conspicuis subtus prominulis, reticulatione gracili sub oculo armato subtus conspicua, petiolulo circa 3 mm. longo suffulta, terminali a lateralibus fere 2 cm. distante, stipellis filiformibus pubescentibus circa 3.5 mm. longis. *Paniculae* partiales in paniculas terminales paucifoliatas vel efoliatas ad 15 cm. longas et 12 cm. latas dispositae, ipsae ad 7 cm. latae; flores e ramusculis lateralibus ad 3 cm. longis racemosim orti; bractae angustae, circa 4 mm. longae, deciduae; bracteolae binae, ad pedicelli apicem positae, circa 3 mm. longae, angustae, deciduae; rhachis, ramuli, et pedicelli densius fulvo-tomentelli vel etiam parce pubescentes; pedicelli ad 1 cm. longi, breviter pubescentes. *Calyx* extra pubescens, ad 6.5 mm. longus; lobi postici approximati, breves, laterales et anticus deltoidei, acuti, 1.5 mm. longi, 2 mm. lati. *Vexillum* oblongum, basi cordatum, bicallosum, 1.5 cm. longum, 0.8 cm. latum, dorso sericeum, ungui 3 mm. longo suffultum; alae 14 mm. longae, 4 mm. latae, basi auriculatae, apicem versus angustatae, obtusae vel rotundatae, extra apicem versus sparse sericeae, ungui 5 mm. longo suffultae; carinae petala basi auriculata, 12 mm. longa, 4.5 mm. lata, extra apice sericea, ungui 5 mm. longo suffulta. *Stamina* monadelpha, vexillari basi tantum ab aliis libero. *Ovarium* 1 cm. altum, subsessile, sericeum, stylo basi sericeo apicem versus glabro, ovulis 7.

Chawm Tawng, Mê Kang, 300 m., mixed forest by stream, *Kerr* 5355.

Millettia Kityana *Craib* [Leguminosae-Galegeae]; a *M. nitida* Benth., cui maxime affinis foliolis basi cordatulis, legumine iuvenili glabro recedit.

Ramuli lignosi, alte scandentes, cito glabri, straminei vel brunneo-straminei, striati. *Folia* 9-foliolata, petiolo 6-8.5 cm. longo incluso 23-30 cm. longa, petiolo basi conspicue incrassato cum rhachi longitudinaliter striato et supra anguste canaliculato glabro; stipulae saepe diutius persistentes, subulatae, 6-8 mm. longae; foliola oblongo-oblancoolata, apice acuminata, apiculata, basi rotundata, cordatula, 5.5-12 cm. longa, 2.3-4.5 cm. lata, coriacea vel subcoriacea, supra glabra, sicco plumbea, subtus sparse inconspicue adpresse hirsuta, sicco pallide viridia, nervis lateralibus utrinque circa 10 aliis paululo minus conspicuis additis intra marginem anastomosantibus pagina utraque conspicuis, nervulis rete gracile pagina utraque conspicuum efficientibus, incrassato-marginata, petiolulo 4-5 mm. longo transverse corrugato glabro suffulta; stipellae persistentes, subulatae, petiolulis subaequilongae, vel iis paululo longiores. *Inflorescentia* e racemis axillaribus foliis paulo longioribus, e paniculis axillaribus pauciramosis foliis duplo longioribus, vel e paniculis terminalibus copiose ramosis ad 40 cm. longis et 30 cm. diametro, iuventute adpresse ferrugineo-pubescentibus, mox glabra; bracteae cito deciduae, alabastra iuvenilia longe superantes, adpresse ferrugineo-pubescentes; flores ad nodos solitarii, pedicellis ad 4 mm. longis adpresse ferrugineo-pubescentibus suffulti. *Calyx* 6.5 mm. longus, subtruncatus, extra iuventute dense adpresse ferrugineo-pubescentibus, maturus sparse pubescens, intra superne adpresse ferrugineo-pubescentibus. *Vexillum* 2 cm. longum, 1.6 cm. latum, basi bicallosum, breviter unguiculatum, dorso adpresse ferrugineo-pubescentibus; alae ungui lato 3 mm. longo incluso 21 mm. longae, 4 mm. latae, basi longius auriculatae; carina ungui lato 3 mm. longo incluso 15 mm. alta, apice 15 mm. lata, basi conspicue truncato-auriculata. *Stamen* vexillare liberum, aliis alternatim longioribus et brevioribus. *Pistillum* glabrum; ovarium stipite brevi lato incluso 14 mm. longum, stylo 4.5 mm. longo, stigmatibus capitato, ovulis 10.

Chiengmai, 300 m., by village, *Kerr* 3347.

***Millettia venusta* Craib** [Leguminosae-Galegeae]; species nova *M. Cubitii* Dunn, similis, sed foliolis basi latis, ovario sparse adpresse pubescente haud sericeo differt.

Frutex ad 2.5 m. altus (ex *Kerr*); ramuli iuventute hic et illic parcissime pubescentes, cito glabri, cortice brunneo mox cinereo obtecti, lenticellis paucis inconspicuis. *Folia* petiolo 4.5-7.5 cm. longo excluso 17-29 cm. longa, et petiolo et rhachi supra canaliculatis et in sulco breviter crispatis pubescentibus; stipulae breves, deciduae; foliola ad 19, opposita, oblonga, late oblonga vel subovata, apice acuminata, obtusa, basi lateraliter truncata rotundatave, saepissime parum inaequilateraliter, terminaliter cuneato, 4-8.5 cm. longa, 2.5-3.5 cm. lata, terminali lateralibus saepissime longiore, chartacea, sicco pagina utraque viridia, inferiore parum pallidiora, ad costam supra breviter crispatis pubescentia, aliter glabra, nervis lateralibus utrinque 8-10 supra subconspicuis subtus

prominulis, nervulis rete gracile pagina utraque subconspicuum efficientibus, petiolulo 3-4 mm. longo sicco fusco supra subplano vel parum canaliculato breviter parce pubescente suffulta, terminali a lateralibus 4-6 mm. distante; stipellae persistentes, subulatae, circa 2.5 mm. longae. *Racemi* axillares, pedunculo communi 1-9 cm. longo incluso 13-24 cm. longi, et pedunculo et rhachi glabris; flores e ramusculis 3-5 mm. vel mox ad 2 cm. longis orti, purpurei, ad vexilli basem luteo-maculati (ex *Kerr*), pedicellis 3 mm. longis glabris suffulti; bractee parvae, cito deciduae; bracteolae binae, ad pedicelli apicem positae, parvae, ante anthesin deciduae. *Calyx* sicco fuscus, apice ciliatus, aliter glaber, 6-7 mm. longus, lobis posticis fere obsoletis, lateralibus et antico late deltoideis subacutis circa 1.5 mm. longis et 2.5 mm. latis. *Vexillum* subquadratum, 11 mm. longum, 10 mm. latum, basi bicallosum, extra sericeum, intra glabrum, ungui 4 mm. longo suffultum; alae oblongae, apice rotundatae, basi semicordatae, 11 mm. longae, 3.75 mm. latae, ungui 5 mm. longo suffultae, extra apicem versus pilis paucis adpressis instructae; carinae petala basi truncata, 9 mm. longa, 4 mm. lata, ungui 5.5 mm. longo suffulta, extra apicem versus parce sericea. *Ovarium* circa 6 mm. longum, stipite circa 2 mm. longo suffultum, sparse adpresse pubescens, stylo glabro, ovulis 3. *Legumen* iuvenile 11 cm. longum, 1.6 cm. latum, sicco fuscum, acuminatum.

Muang Lôi, 200 m., scrub jungle, *Kerr* 8787.

***Fordia fruticosa* Craib** [Leguminosae-Galegeae]; species nova foliolis chartaceis pagina utraque adpresse pubescentibus, stipellis evolutis, floribus breviter pedicellatis distincta.

Suffrutex ad 40 cm. altus; caules primo sulcati, sparsius adpresse crispatis pubescentes, mox subteretes. *Folia* 15-17-foliolata, petiolo 2.5-3.5 cm. longo incluso 14-17 cm. longa, petiolo cum rhachi supra canaliculato subtus angulato densius subadpresse crispatis pubescente; stipulae diutius persistentes, lineares, acutae vel subobtusae, interdum paulo falcatae, 7 mm. longae, dorso indumento ei caulium simili tectae, intra glabrae, nervis intra subprominentibus; foliola opposita vel mediana hic et illic alterna, oblonga, lanceolata vel ovata, apice acuminata et costa excurrente apiculata, basi rotundata truncatave, saepe cordatula et parum inaequalia, 2-4 cm. longa, 1.3-2 cm. lata, chartacea, pagina utraque sed inferiore densius adpresse albo-pubescentia, sicco inferiore pallida, costa supra conspicua subtus prominente, nervis lateralibus utrinque 5-8 intra marginem anastomosantibus supra subconspicuis subtus prominulis, nervulis paucis pagina utraque subconspicuis, margine adpresse ciliata, petiolulo 1-2 mm. longo subterete pubescente suffulta; stipellae angustae, petiolulis subaequilongae. *Racemi* axillares, petiolis subaequilongi, pedunculo communi 5-15 mm. longo ima basi bibracteato cum rhachi crispatis pubescente suffulti; bractee deciduae, circa 3 mm. longae; bracteolae duae, circa 2 mm. longae, ad pedicelli apicem

paulo infra calycem positae; flores purpurei (ex *Kerr*), pedicellis circa 3 mm. longis breviter pubescentibus suffulti. *Calyx* dorso subsparse adpresse pubescens, 3 mm. longus, dentibus 2 posticis approximatis brevissimis, lateralibus cum antico posticis duplo longioribus. *Vexillum* rotundato-ellipticum, apice emarginatum, basi cordatum, bicallosum, ungui brevi lato incluso 11 mm. longum, 10 mm. latum, dorso sparse sericeum; alae oblongae, basi biauriculatae, apice obtusae, ungui 2.5 mm. longo incluso 11 mm. longae, 4 mm. latae; carinae petala apice obtusa, basi latere altero truncata, ungui vix 3 mm. longo incluso 10 mm. longa, 4 mm. lata, apice pilis paucis adpressis instructa. *Stamina* monadelphia, vexillari ima basi tantum ab aliis libero, antheris ovatis. *Ovarium* adpresse hirsutum, biovulatum.

Mê Hawng Sawm, Mê Cha, 400 m., bank of stream in mixed forest, *Kerr* 5468.

***Padbruggea pubescens* Craib** [Leguminosae-Galegeae]; a *P. atropurpurea* (Wall.), calyce dense breviter adpresse brunneo-vel subferrugineo-pubescente recedit.

Arbor circa 10 m. alta (ex *Kerr*); ramuli (inflorescentes) iuventute densius ferrugineo-tomentosi, mox glabri, sulcati, cortice sub-brunneo plus minusve longitudinaliter fissio obtecti. *Folia* 9-foliolata, petiolo 6-7.5 cm. longo basi incrassato cum rhachi 12-18 cm. longo puberulo vel fere glabro supra plus minusve canaliculato subtus carinata suffulta; foliola opposita vel subopposita, oblongo-lanceolata vel ovato-lanceolata, rarius lanceolata vel oblonga, apice subacuminata, acuta vel obtusa, basi truncata vel cuneata, terminalia aequalia, lateralibus saepissime inaequalia, 7-12 cm. longa, 2.5-5.7 cm. lata, rigide chartacea vel chartaceo-coriacea, matura glabra, nervis lateralibus utrinque 7-8 praesertim superioribus intra marginem anastomosantibus supra conspicuis vel paululo prominulis subtus prominentibus, nervulis rete gracile pagina utraque conspicuum vel subprominulum efficientibus, petiolulo sat valido 4-7 mm. longo glabro suffulta. *Panicula* terminalis, ad 25 cm. longa et 20 cm. diametro, et rhachi et ramulis densius ferrugineo-tomentosis; bractae deciduae, circa 3 mm. longae; flores subsessiles. *Calyx* 6 mm. longus, postice truncatus, lobo antico brevi lateralibus duplo longiore, extra densius breviter pubescens. *Vexillum* late ovatum, 15 mm. diametro, basi subcallosum, ungui lato 4 mm. longo suffultum, glabrum; alae oblongae, apice rotundatae, basi auriculatae, 16 mm. longae, 5 mm. latae, breviter unguiculatae; carina 15 mm. longa, 6 mm. lata, basi auriculata, ungui 5 mm. longo suffulta. *Ovarium* stipite circa 6 mm. longo crispatim pubescente suffultum, 4 mm. altum, ovulis 3, stylo glabro circa 5 mm. longo.

Nakawn Panom, Ta Uten, 200 m., evergreen forest, *Kerr* 8457.

***Shuteria siamensis* Craib** [Leguminosae-Phaseoleae]; ab affini *S. ferruginea* Baker, inter alia calyce multo longiore distinguenda.

Caules herbacei, iuventute pilis arcte reflexis ferrugineis dense recti, canaliculati. *Folia* trifoliolata, petiolo usque ad 8 cm. longo pilis ferrugineis reflexis instructo supra canaliculato suffulta; stipulae persistentes, oblongo- vel ovato-lanceolatae, acutae, ad 8 mm. longae et 4 mm. latae, extra adpresse pubescentes, intra glabrae, striatae; foliola lateralia inaequilateralia, latere altero dimidio ovata, basi rotundata truncatave, altero dimidio lanceolata vel oblanceolata, basi rotundata, terminali subrhombeo basi late cuneato, omnibus apice longius acute attenuatis vel acuminatis ad 6 cm. longis et 3.6 cm. latis firme chartaceis pagina utraque sed inferiore mollius adpresse hirsutis, nervis lateralibus utrinque circa 6 ad marginem currentibus supra conspicuis vel subconspicuis subtus prominentibus nervis transversis subtus prominulis, petiolulo 3 mm. longo sat valido densius adpresse ferrugineo-hirsuto suffultis, terminali a lateralibus circa 1 cm. distante; stipellae lineares, striatae, petiolulos subaequantur vel iis paululo longiores. *Racemi* axillares, simplices vel pauci-ramosi, maturi foliis subaequilongi, breviter pedunculati, rhachi indumento ei caulium simili sed pallidiore tecto; flores purpurei (ex *Kerr*), pedicellis circa 3 mm. longis suffulti, ad nodos solitarii vel saepius gemini; bractae conspicuae, sub anthesin persistentes vel deciduae, obovatae, apice breviter acuminatae, 7 mm. longae, 5 mm. latae, extra adpresse pubescentes, intra glabrae, striatae; bracteolae angustae, 4 mm. longae, ad apicem pedicelli positae; alabastra longe acuminata. *Calycis* extra pilis paucis albis adpressis sparse instructi tubus 6 mm. longus, lobi postici in unum deltoideum apice attenuatum acutum 3.5 mm. longum et latum connati, laterales lanceolati, apice attenuati, acuti, 3 mm. longi, 1.5 mm. lati, antico lateralibus simili nisi angustiore et postico subaequilongo, antico et lateralibus basi imbricatis. *Vexillum* sublyratum, basi anguste auriculatum, ecallosum, apice subtruncatum, ungui sat lato 3 mm. longo incluso 15 mm. longum, 7.5 mm. latum; alae oblongae, apice rotundatae, basi cordato-auriculatae, ungui 1 cm. longo incluso 1.6 cm. longae, 3 mm. latae; carinae petala basi truncata vel rotundato-truncata, ungui 1 cm. longo incluso 1.6 cm. longa, 3.5 mm. lata. *Stamen* vexillare ab aliis liberum, filamentis alternatim longioribus et brevioribus, antheris brevibus. *Ovarium* circa 3 mm. longum, ad suturas sericeum, stipite circa 2 mm. longo suffultum, disco tubulari stipitis basem cingente; stylus inferne gracilis, apicem versus incrassatus, glaber, stigmate parvo capitato, ovulis 3. *Legumen* ad 2.7 cm. longum et 7 mm. latum, stipitatum, styli basi persistente apiculatum.

Doi Angka, 1600-2000 m., *Kerr* 6305.

***Spatholobus compar* Craib** [Leguminosae-Phaseoleae]; a *S. Harmandii* Gagnep., calycis lobis posticis paululo altius connatis, vexillo latiore basi truncato, ovarii indumento conspicue sparsiore recedit.

Frutex volubilis; ramuli iuventute breviter adpresse ferrugineo-

pubescentes, mox glabri, cortice cinereo vel brunneo-cinereo obtecti, lenticellis vix conspicuis. *Folia* trifoliolata, petiolo 5-8 cm. longo basi incrassato adpresse ferrugineo-pubescente aliter glabro inferne et superne supra parum canaliculato aliter subterete suffulta; stipulae deciduae, 3 mm. longae, basi incrassatae; foliola symmetrica vel lateralialia parum inaequilateralialia, oblonga vel oblongo-ob lanceolata, apice acuminata, summo apice obtusa vel retusa, basi rotundata vel cuneato-rotundata vel terminali late cuneato, ad 12 cm. longa et 4.7 cm. lata, coriacea, supra glabra, subtus ad costam adpresse ferrugineo-pubescentia, aliter pilis inconspicuis ferrugineis adpressis sparse instructa, nervis lateralibus utrinque circa 8 intra marginem anastomosantibus pagina utraque sed praesertim inferiore prominulis, nervulis rete laxum pagina utraque prominulum efficientibus, petiolulis incrassatis 5 mm. longis adpresse ferrugineo-pubescentibus suffulta, terminali a lateralibus ad 1.5 cm. distante; stipellae ad 2 mm. longae. *Flores* albi (ex *Kerr*), in paniculas ramulis brevibus lateralibus foliatis vel efoliatis gestas ad 15 cm. longas dispositi; bractae parvae, deciduae; pedicelli ad 3 mm. longi, medio bracteolati, cum rhachi ramulisque breviter densius pubescentes. *Calyx* extra breviter pubescens, intra tenuiter sericeus; tubus 2.5 mm. longus; lobi oblongi, subacuti, 1.5 mm. longi, duo postici in unum apice emarginatum connati, ciliati. *Vexillum* subquadratum, apice emarginatum, basi truncatum, ungui 2.5 mm. longo excluso 5 mm. longum, 7 mm. latum; alae basi truncatae, ungui 2.5 mm. longo excluso 4.75 mm. longae, 2.5 mm. latae; carina basi obtuse auriculata, ungui 3.5 mm. longo excluso 4 mm. longa, 2 mm. lata. *Stamen* vexillare ab aliis liberum. *Ovarium* sessile, adpresse pubescens, stylo inferne sparse adpresse pubescente superne glabro.

Kaw Chang, Klawng Nonsi, under 10 m., evergreen by stream, *Kerr* 9167.

***Spatholobus dimorphus* Craib** [Leguminosae-Phaseoleae]; caule basi ramulos prostratos paniculas gerentes emittente distinguendus.

Frutex volubilis, ad basem ramulos prostratos inflorescentiam vel etiam folia gerentes emittens (ex *Kerr*); ramuli primo breviter adpresse pubescentes, mox glabri, angulati vel striati. *Folia* trifoliolata, petiolo 7-13.5 cm. longo primo pilis fulvis adscendentibus sat longis dense tecto mox sparse adpresse hirsuto vel fere glabro basi incrassato subterete vel superne supra parum complanato suffulta; stipulae saepissime fugaces, oblongae, obtusae, 9 mm. longae, 2.5 mm. latae, dorso adpresse fulvo-hirsutae, intra superne glabrae, basi parce adpresse hirsutae, ciliatae; foliola lateralialia inaequilateralialia, latere inferiore dimidio ovata vel ovato-oblonga, basi rotundata vel rotundato-cuneata, superiore dimidio oblonga vel oblanceolata, basi cuneata, terminali oblongo-obovato vel fere obovato basi cuneato, omnibus apice breviter acuminatis obtusis vel apiculatis ad 18 cm. longis et 8.8 cm. latis rigide chartaceis

sicco supra plus minusve plumbeis subtus subviridibus pagina superiore maturis glabris inferiore primo dense adpresse fulvo-hirsutis mox ad costam nervosque laterales sparse hirsutis vel glabris, nervis lateralibus utrinque 8-10 intra marginem anastomosantibus cum costa supra prominulis subtus prominentibus, nervulis pagina utraque sed praesertim inferiore prominulis, petiolulis 5 mm. longis sparse hirsutis suffultis, terminali a lateralibus 2.5-4.5 cm. distante; stipellae petiolulis fere duplo longiores. *Paniculae* ex axillis foliorum delapsorum ortae, basi bracteatae, rhachi iuventute plus minusve breviter pilosae, ramulis pubescentibus; pedicelli graciles, 3-4 mm. longi; bractae fugaces. *Calyx* extra densius fulvo-pubescentis, intra adpresse albo-pubescentis; tubus 1.5 mm. longus; lobi inter se subaequilongi, suboblongi, apice obtusi, 2 mm. longi, postici inter se saltem ad medium connati. *Vexillum* suboblatum, apice emarginatum, basi truncatum, ecallosum, ungui 2 mm. longo excluso 6 mm. longum, 8 mm. latum; alae oblongae, apice rotundatae, basi biauriculatae, ungui 3.75 mm. longo excluso 5.5 mm. longae, 2.5 mm. latae; carina basi truncata vel subauriculata, ungui 4 mm. longo excluso 4 mm. longa, 2.5 mm. lata. *Stamen* vexillare sub anthesin ab aliis liberum, antheris apiculatis. *Ovarium* adpresse hirsutum, sessile, stylo inferne parce hirsuto superne glabro.

Lôi, Kao Krading, 1000 m., evergreen forest, *Kerr* 8744, 8744A.

***Spatholobus floribundus* Craib** [Leguminosae-Phaseoleae]; a *S. suberecto* Dunn, alae carinaeque petalis basi truncatis vel paululo auriculatis haud conspicue auriculatis recedit.

Frutex volubilis; ramuli primo densius fulvo-pubescentes, striati, cito fusci, conspicue pallide lenticellati, mox brunneo-corticati. *Folia* trifoliolata, petiolo 3.5-7.5 cm. longo basi incrassato supra parum canaliculato sparse adpresse hirsuto suffulta; stipulae fugaces; foliola lateralia inaequilateralia, latere inferiore dimidio ovata, basi truncata, superiore dimidio oblonga vel oblongo-lanceolata, basi rotundata vel cuneata, terminali elliptico vel late elliptico basi rotundato, omnibus apice acuminatis mucronulatis usque ad 13.5 cm. longis et 8 cm. latis chartaceis pagina utraque primo pilis adpressis sparse instructis maturis fere glabris inferiore in nervorum axillis saepe pilosis, nervis lateralibus utrinque 8-10 intra marginem anastomosantibus cum costa supra conspicuis vel subprominulis subtus prominentibus, nervulis rete sub oculo armato gracile subtus conspicuum supra subconspicuum vel saepe parum impressum efficientibus, petiolulis circa 5 mm. longis sparse pubescentibus supra carinatis apice canaliculatis suffultis, terminali a lateralibus ad 2 cm. distante; stipellae petiolulis saltem dimidio breviores. *Flores* albi (ex *Kerr*), in paniculam terminalem inferne foliatam ad 40 cm. longam dispositi; ramuli primarii inferiores ad 18 cm. longi, pedunculo communi ad 4 cm. longi suffulti; ramuli secundarii 9-10 cm. longi, flores in ramulos circa 3 mm. longos dispositos gerentes; et rhachis et

ramuli primo densius fulvo-pubescentes, cito plus minusve glabrescentes; bracteae et bracteolae parvae, deciduae; pedicelli circa 1.5 mm. longi. *Calyx* extra breviter sparse sericeus, intra sericeus; tubus 2 mm. longus; lobi inter se aequilongi, postici in unum oblatum apice retusum connati, 0.75 mm. longi. *Vexillum* subquadratum, apice emarginatum, basi truncatum, ungui sat lato 2.5 mm. longo excluso 5.5 mm. longum, 6 mm. latum, glabrum, ecallosum; alae basi truncatae vel cordatulae, ungui 3 mm. longo excluso 4.5 mm. longae, 2-2.5 mm. latae; carina basi truncata vel cordatula, ungui 3 mm. longo excluso 3.5 mm. longa, 2.5 mm. lata. *Stamen* vexillare ab aliis liberum. *Ovarium* sessile, adpresse albo-pubescent, stylo ima basi sparse adpresse pubescente aliter glabro.

Doi Sutep, 1560 m., evergreen forest, *Kerr* 1826.

***Atylosia siamensis* Craib** [Leguminosae-Phaseoleae]; ab affini *A. barbata* Baker, bracteis floribusque conspicue longioribus facile distinguenda.

Ramuli volubiles, iuventute pilis longiusculis fulvis et brevioribus albis ambobus adpressis et reflexis pilis longioribus cito divaricatis instructi, mox sparse pilosi et puberuli. *Folia* trifoliolata, petiolo 2-5.5 cm. longo sulcato indumento ei ramulorum simili tecto suffulta; stipulae persistentes, lanceolatae vel anguste lanceolatae, apice attenuatae vel acuminato-attenuatae, circa 8 mm. longae, dorso sparse pilosae et puberulae, longe ciliatae; foliola lateralia inaequilateralia, latere altero dimidio lanceolata, basi rotundata, altero dimidio ovata vel subrhombeo-ovata, basi rotundata truncatave, omnibus apice subacuminatis apiculatis ad 7.5 cm. longis et 4.3 cm. latis chartaceis vel rigide chartaceis sicco viridibus subtus pallidioribus supra breviter pubescentibus subtus ad costam nervos nervulosque molliter pubescentibus et glandulis parvis instructis trinerviis nervis lateralibus utrinque 4-5 cum costa supra conspicuis subtus prominentibus nervis transversis inter se parallelis subtus prominulis ciliatis petiolulis ad 3 mm. longis pilosis et puberulis suffultis, foliolo terminali a lateralibus 1-1.5 cm. distante; stipellae persistentes, filiformes, 4 mm. longae, pubescentes. *Racemi* axillares, pedunculo communi incluso mox ad 34 cm. longi, et pedunculo et rhachi mox validis indumento ei ramulorum simili tectis; flores lutei (ex *Kerr*), ad nodos gemini, pedicellis 7-10 mm. longis pilosis et puberulis suffulti; bracteae deciduae, ovato-lanceolatae, caudato-acuminatae, vix 12 mm. longae, 4 mm. latae, dorso adpresse pubescentes, ciliatae; alabastra acuminata. *Calycis* extra pilosi et intra sparse adpresse pilosi tubus 4 mm. longus, lobi 5, duo postici vix ad medium connati, lanceolati, acuti, 4.5 mm. longi, 1.5 mm. lati, laterales posticis similes sed breviores et angustiores, antico lanceolato acuminato 12 mm. longo 3 mm. lato, omnibus ciliatis. *Vexillum* oblato-rotundatum, apice emarginatum, 2.3 cm. longum, 2.5 cm. latum, ungui 5 mm. longo suffultum, glabrum, basi auriculatum et paulo

supra basem bicallosum; alae basi auriculatae, supra auriculam constrictae, ungui 6 mm. longo incluso 2.5 cm. longae, 1 cm. latae; carinae petala basi dimidio late cuneata, haud auriculata, ungui 6 mm. longo incluso 2 cm. longa, 1 cm. lata. *Stamen* vexillare liberum. *Ovarium* dense sericeum, 1 cm. longum, stylo basi pilis paucis adpressis instructo inferne gracili superne incrassato rigido, stigmatе capitato terminali. *Legumen* iuvenile longe pilosum praetereaue pubescens.

Saraburi, Muak Lek, 200 m., scrub, *Kerr* 10004.

***Rhynchosia calcicola* Craib** [Leguminosae-Phaseoleae]; ab affini *R. nummularia* DC., foliolis acuminatis facile distinguenda.

Caules herbacei, graciles, sulcati, primo pilis paucis divergentibus instructi, mox glabri. *Folia* trifoliolata, petiolo usque ad 6 cm. longo basi incrassato supra anguste canaliculato pilis longiusculis divergentibus hic et illic instructo suffulta; stipulae lanceolatae, 2.75 mm. longae, cito deciduae, longius ciliatae, aliter pilis perpaucis instructae, parce glandulosae; foliola lateralia inaequilateralia, latere altero dimidio ovata vel subrhombea, basi truncata vel rotundato-truncata, altero dimidio lanceolata vel ovato-lanceolata, basi rotundata, terminali ovato late ovato vel rotundato-ovato basi truncato, omnibus apice longius subacute acuminatis sicco viridibus subtus pallidioribus supra ad costam nervosque breviter pubescentibus aliter setulis brevibus et paucis longioribus instructis subtus setulis ad costam nervos nervulosque hic et illic instructis praetereaue aureo-glandulosis, nervis lateralibus utrinque circa 8 supra plus minusve conspicuis subtus prominulis, nervis transversis subtus subprominulis, margine longius ciliatis; petioluli 2 mm. longi, puberuli, foliolo terminali a lateralibus 1-1.3 cm. distante. *Inflorescentia* axillaris e floribus 2-3 ad apicem pedunculi brevis positus vel ad nodos rhacheos subaphylli fasciculatis constituta; flores lutei (ex *Kerr*), pedicellis 3 mm. longis breviter pubescentibus suffulti; bractae parvae, cito deciduae. *Calyx* extra sparse pubescens et glandulosus, intra glaber; tubus 2 mm. longus; lobus anticus deltoideus, apice attenuatus, acutus, 2.5 mm. longus, 2 mm. latus; lobi laterales deltoidei, acuti, 1 mm. longi, postici in unum apice bicuspidatum 1.25 mm. longum, 2.5 mm. latum connati, omnibus ciliatis. *Vexillum* stipite incluso 1 cm. longum, lamina ovata 7 mm. lata basi auriculata haud callosa in unguem latum circa 2 mm. longum angustata; alae 6 mm. longae, 2.5 mm. latae, basi latere uno auriculatae, ungui 2.5 mm. longo suffultae; carina pro magnitudine longius rostrata, 6.5 mm. longa, ungui 2.5 mm. longo suffulta. *Stamen* vexillare ab aliis liberum, filamentis alternatim longioribus et brevioribus, antheris parvis. *Ovarium* 1.5 mm. longum, stipite brevi basi disco cincto suffultum, glabrum, bi-ovulatum; stylus vix 3 mm. longus, glaber, inferne aequaliter teres, supra medium incrassatus et complanatus, stigmatе terminali capitato. *Legumen*

circa 10 mm. longum et 9 mm. latum, apiculatum, conspicue nervosum.

Korat, Chantûk, Kao Sisiat A, 500 m., crevices of limestone rocks, *Kerr* 9105.

Rhynchosia distans *Craib* [Leguminosae-Phaseoleae]; species ramulis lignosis, foliolo terminali a lateralibus longe distante, floribus inter maiores, legumine brevi fulvo, seminibus cyaneis exarillatis distincta.

Frutex volubilis; ramuli primo fulvo-pilosi, striati, mox glabri, lignosi, ad 5 mm. diametro. *Folia* trifoliolata, petiolo 6-11 cm. longo indumento ei ramulorum simili instructo sulcato suffulta; stipulae parvae, fugaces; foliola lateralia inaequilateralia, latere inferiore dimidio ovata, basi truncata, superiore dimidio lanceolata vel late lanceolata, basi rotundata, terminali late rhomboideo basi truncato vel rotundato-truncato, omnibus apice longius acute acuminatis ad 8 cm. longis et 6.5 cm. latis chartaceis sicco viridibus subtus pallidioribus supra parce pubescentibus et pilis longioribus hic et illic instructis subtus praesertim ad costam nervosque pubescentibus et parce aureo-glandulosis trinerviis, nervis secundariis (e costa ortis) utrinque 4-6 intra marginem anastomosantibus cum basalibus et costa supra conspicuis subtus prominulis, nervis transversis subtus subprominulis, ciliatis petiolulo 3-4 mm. longo densius fulvo-pubescente suffultis, terminali a lateralibus 3-3.5 cm. distante; stipellae deficientes. *Racemi* axillares, simplices, solitarii vel gemini, petiolos subaequantes, breviter pedunculati; pedunculus cum rhachi et pedicellis densius fulvo-pubescentibus; bracteae deciduae; pedicelli ad nodos solitarii vel gemini, 5 mm. longi; flores lutei, rubro-lineati (ex *Marcan*). *Calyx* extra densius fulvo-pubescentibus, intra sparse sericeus; tubus 2-2.5 mm. longus; lobi postici ad medium connati, laterales posticis subaequilongi, lineari-lanceolati, 4 mm. longi, antico lineari-lanceolato 6 mm. longo, omnibus acutis ciliatis. *Vexillum* elliptico-obovatum, apice emarginatum, basi auriculatum, haud callosum, ungui 3 mm. longo excluso 1.3 cm. longum, 1 cm. latum, dorso pilosum; alae suboblongae, basi latere altero auriculatae, altero paulo superius dentatae, ungui 3 mm. longo excluso 10 mm. longae, 3.5 mm. latae, superne medio parce pubescentes; carinae petala basi subtruncata, ungui 6 mm. longo excluso 9 mm. longa, 4.5 mm. lata. *Ovarium* dense sericeum, stylo inferne pubescente. *Legumen* fulvum, styli basi persistente acuminatum, ad 2 cm. longum, pilosum et densius breviter pubescentibus; semina 1-2, ambitu oblonga, nitida, cyanea, exarillata.

Pak Chawng, 400 m., evergreen jungle, *Marcan* 1562.

Rhynchosia Marcanii *Craib* [Leguminosae-Phaseoleae]; ab affini *R. viscosa* DC., floribus maioribus, calycis lobo antico multo longiore, petalorum unguibus pro rata longioribus, ovario sericeo distinguenda.

Caules annui (?), volubiles, primo pilosi et pubescentes, mox pubescentes, striati, pallide corticati. *Folia* trifoliolata, petiolo 6-7.5 cm. longo piloso supra canaliculato suffulta; stipulae cito reflexae, mox deciduae, lanceolatae vel lanceolato-deltoidae, basi haud productae, ad 8 mm. longae et 3 mm. latae, costatae, pagina utraque pilosae, ciliatae; foliola lateralia inaequilateralia, latere inferiore dimidio late ovata, basi truncata, superiore lanceolata vel oblongo-lanceolata, terminali oblato-rhomboideo basi rotundato vel fere truncata, omnibus apice acuminatis acutis usque ad 6 cm. longis et 5.5 cm. latis chartaceis pagina superiore viridibus inferiore pallide viridibus superiore parce pilosis inferiore ad costam nervosque laterales et transversos pubescentibus glandulosis trinerviis, nervis secundariis (e costa ortis) utrinque 3-4 cum basalibus ad marginem currentibus supra conspicuis vel subconspicuis subtus prominulis, ciliatis petiolulo circa 2 mm. longo suffultis, terminali a lateralibus 1.5-1.8 cm. distante; stipellae filiformes, petiolulis subaequilongae vel iis dimidio breviores, interdum deciduae, interdum persistentes. *Racemi* axillares, pedunculo communi ad 2 cm. longo incluso inflorescentes ad 10 cm. infructescentes ad 15 cm. longi, pedunculo cum rhachi et pedicellis piloso et pubescente; bractae lanceolatae, acuminatae, 5-6 mm. longae, pilosae, deciduae; flores lutei (ex *Marcan*), breviter pedicellati. *Calyx* extra pilosus et glandulosus, intra subsericeus; tubus 2.5-3 mm. longus; lobi postici in unum ad 4 mm. longum vix ad medium bilobatum connati, laterales lineari-lanceolati, 3-4 mm. longi, 1.25 mm. lati, infimo lineari-lanceolato 7 mm. longo 1.25 mm. lato, omnibus ciliatis apice acutis. *Vexillum* subellipticum, apice rotundatum, basi auriculatum et medio bicallosum, ungui 3 mm. longo excluso 1.2 cm. longum, 1 cm. latum, dorso pilosum et glandulosum; alae suboblongae, basi latere altero longius auriculatae, altero paulo superius parvi-auriculatae, ungui 2.5 mm. longo excluso 10 mm. longae, 4 mm. latae; carinae petala basi cuneato-truncata, ungui 4 mm. longo excluso 10 mm. longa, 5 mm. lata. *Stamen* vexillare sub anthesin ab aliis omnino liberum, antheris oblongis. *Ovarium* dense sericeum, sessile, 4 mm. longum, stylo inferne gracili piloso superne incrassato indurato glabro, stigmatibus terminali. *Legumen* vix 3 cm. longum, apiculatum, brunneum, pilosum, parce glandulosum; semina 1-2, marmorata, exarillata.

Saraburi, Muak Lek, 200 m., clearing, *Marcan* 1856.

***Flemingia brevipes* Craib** [Leguminosae-Phaseoleae]; a *F. sootepense* Craib, petiolis haud alatis, petalorum unguibus pro rata brevioribus recedit.

Frutex ad 2 m. altus (ex *Kerr*); ramuli primo sericei, trigoni, mox plus minusve glabrescentes, 3-4 mm. diametro. *Folia* trifoliolata, petiolo 5-9 cm. longo basi incrassato supra saltem superne canaliculato subtus plurisulcato indumento ei ramulorum simili instructo suffulta; stipulae saepissime cito deciduae, lanceolatae, apice

longe acute attenuatae, 1.5 cm. longae, dorso sericeae; foliola lateralia inaequilateralia, latere inferiore dimidio ovato-lanceolata, basi rotundata vel truncata, superiore dimidio lanceolata vel oblanceolata, basi cuneata, terminali late lanceolato vel oblongo-lanceolato basi cuneato, omnibus apice angustatis vel subacuminatis acutis usque ad 19 cm. longis et 6.5 cm. latis chartaceis supra viridibus ad costam nervosque laterales adpresse pilosis plus minusve glabrescentibus aliter sparse brevissime setulosis subtus pallidioribus ad costam nervosque laterales pilosis ad nervulos sparse pilosis rubroglandulosis, e basi 3-4-nerviis, nervis secundariis (e costa ortis) utrinque 7-10 obliquis rectis intra marginem anastomosantibus supra conspicuis subtus prominentibus, nervis transversis inter se parallelis subtus prominulis, petiolulo 4-7 mm. longo supra canaliculato dense adpresse piloso suffultis, terminali a lateralibus ad 7 mm. distante. *Racemi* axillares, petiolis dimidio breviores, subsessiles, simplices vel pauci-ramosi; bracteae deciduae, lanceolato-ovatae, acuminatae, 3 mm. longae; pedicelli 3 mm. longi, sericei. *Calycis* extra sericei intra breviter sparse adpresse pubescentis tubus 2 mm. longus, lobus anticus lineari-lanceolatus, 6 mm. longus, 1.25 mm. latus, lobi laterales 4 mm. longi, postici lateralibus similes nisi paululo longiores, omnibus acutis ciliatis. *Vexillum* late ellipticum, basi auriculatum, ungui 1.5 mm. longo incluso 9 mm. longum, 7 mm. latum; alae basi longius auriculatae, ungui 2 mm. longo incluso 6.5 mm. longae, 2 mm. latae; carina basi subtruncata, ungui 3 mm. longo incluso 10 mm. longa, 3 mm. lata. *Stamen* vexillare sub anthesin ab aliis liberum. *Legumen* sessile, ad 12 mm. longum, puberulum et sparse aureo-glandulosum.

Krat, Kao Saming, under 20 m., edge of evergreen forest, *Kerr* 9406.

***Flemingia sarmentosa* Craib** [Leguminosae-Phaseoleae]; ab affini *F. paniculata* Wall., calyce multo longiore recedit.

Frutex sarmentosus, circa 1 m. altus (ex *Kerr*); ramuli teretes, primo plus minusve sulcati, pilis longiusculis divaricatis instructi praetereaue puberuli, cito plus minusve glabrescentes, mox cortice rubro obtecti, lenticellis haud conspicuis. *Folia* unifoliolata, petiolo 1.2-2.3 cm. longo piloso supra planiusculo subtus carinato suffulta; stipulae fugaces, cicatricibus angustis conspicuis ramulos fere cingentibus; foliola oblongo-ovata vel lanceolato-ovata, saepe parum inaequilateralia, apice acute acuminata, basi cordatula vel truncata, 9-17 cm. longa, 4-10.5 cm. lata, chartacea, supra ad costam nervosque plus minusve pubescentia, subtus sparse molliter pilosa vel pubescentia et aureo-glandulosa, e basi 5-nervia, nervis secundariis (e costa ortis) utrinque 6-8 rectis obliquis intra marginem ipsam anastomosantibus supra conspicuis subtus prominentibus, nervis transversis inter se parallelis sat approximatis supra subconspicuis vel fere obscuris subtus prominulis, margine apicem versus saepissime parum undulata. *Inflorescentia* axillaris, subsessilis,

e basi ramosa, petiolo duplo longior, basi bracteis brunneis costatis deciduis instructa; flores subalbidi, alis purpureis (ex *Kerr*), pedicellis 3-4 mm. longis suffulti; bracteae cito deciduae, circa 1 cm. longae, lineares, apice longe acute attenuatae, pilosae; rhachis cum ramulis pedicellisque plus minusve pilosus et puberulus. *Calyx* extra pilosus, intra breviter adpresse pubescens; tubus 2 mm. longus; lobi postici 7 mm. longi, laterales cum antico posticis paulo breviores, omnibus nisi antico lineari-lanceolato linearibus apice longius acute attenuatis ciliatis. *Vexillum* late ellipticum, apice emarginatum, basi auriculatum, 5 mm. longum et latum, ungui 1.5 mm. longo suffultum; alae basi latere uno auriculatae, ungui 1.5 mm. longo excluso 4.5 mm. longae, 2 mm. latae; carinae petala basi latere uno subtruncata, ungui 1.75 mm. longo excluso 5.5 mm. longa, 3 mm. lata. *Stamen* vexillare sub anthesin ab aliis liberum. *Pistillum* generis, ovario piloso et glanduloso. *Legumen* stramineum, 13 mm. longum, pilosum et glandulosum.

Mê Kammi, 360 m., evergreen forest, *Kerr* 2380.

Flemingia wangkae *Craib* [Leguminosae-Phaseoleae]; a *F. Kerrii* *Craib*, foliis maioribus longius petiolatis, floribus longioribus inter alia recedit.

Frutex circa 4 m. altus (ex *Kerr*); ramuli sparse adpresse hirsuti, mox plus minusve glabrescentes, sulcati, parce glandulosi, mox ad 7 mm. diametro, lenticellis parvis conspicuis. *Folia* trifoliolata, petiolo 4-11 cm. longo sparse pubescente et glanduloso superne alato subtus carinato et sulcato suffulta; stipulae fugaces; foliola lateralia inaequilaterialia, latere inferiore dimidio ovata, basi rotundata truncata, superiore dimidio oblanceolata, basi cuneata, terminali oblongo-obovato vel subrhombeo basi cuneato, omnibus apice acuminatis acutis usque ad 16 cm. longis et 9 cm. latis chartaceis supra sicco viridibus ad costam nervosque laterales breviter pubescentibus mox fere glabris aliter sparse breviter setulosis subtus pallidioribus ad costam nervosque laterales pubescentibus vel pilosis ad nervulos parce pubescentibus aureo-glandulosis, e basi 3-5-nerviis, nervis lateralibus basalibus obliquis elongatis, nervis secundariis (e costa ortis) utrinque 6-8 rectis obliquis intra marginem anastomosantibus supra conspicuis subtus prominentibus, nervis transversis inter se parallelis subtus prominulis, petioulis 5-7 mm. longis crispatis pubescentibus glandulosis supra canaliculatis suffultis, terminali a lateralibus ad 8 mm. distante. *Racemi* e foliorum axillis orti vel etiam ramulis defoliatis gesti, simplices vel e basi pauci-ramosi, subsessiles; bracteae deciduae, ovatae, 2 mm. longae, costatae, dorso sericeae et glandulosae; pedicelli 1.5 mm. longi, cum rhachi sericei et parce glandulosi. *Calycis* extra adpresse albo-pubescentis et glandulosi intra breviter adpresse pubescentis tubus vix 2 mm. longus, lobus anticus oblongo-lanceolatus, subacutus, 5 mm. longus, 1.75 mm. latus, lobi laterales lanceolati, 2.5 mm. longi, 0.75 mm. lati, postici basi breviter connati, lateralibus subaequilongis, omnibus apice acutis. *Vexillum* viridi-album, purpureo-venosum (ex *Kerr*), obovatum,

basi auriculatum, ungui 2 mm. longo excluso 10 mm. longum, 9 mm. latum; alae purpureae (ex *Kerr*), basi breviter auriculatae, ungui 2 mm. longo excluso 7 mm. longae, 3 mm. latae; carina viridi-alba, purpureo-venosa (ex *Kerr*), basi rotundato-cordatula, ungui 3 mm. longo excluso 9 mm. longa, 4 mm. lata. *Stamen* vexillare sub anthesin ab aliis liberum.

Kanburi, Wangka, 200 m., bamboo forest, *Kerr* 10303.

***Sophora dispar* Craib** [Leguminosae-Sophoreae]; peraffinis *S. Dunii* Prain, ex descr., sed foliolis angustioribus recedit.

Frutex ad 2 m. altus (ex *Kerr*); ramuli dense fulvo-tomentosi, saepe mox pallescentes. *Folia* 19–25-foliolata, petiolo 10–15 mm. longo incluso 15–25 cm. longa, et petiolo et rhachi indumento ei ramulorum simili tectis; foliola opposita vel alterna, lanceolata vel anguste oblonga, apice subacuta, longius apiculata, basi parum inaequilateralia, truncato-cordatula, ad 5 cm. longa et 1.4 cm. lata, chartacea, supra glabra, sicco fusca, subtus dense plus minusve adpresse ferrugineo-pubescentia, nervis lateralibus utrinque circa 6 obscuris, nervulis omnino obscuris, ciliata, petiolulo circa 1 mm. longo dense ferrugineo-pubescente suffulta; stipulae angustae, diutius persistentes, 8 mm. longae, pubescentes. *Racemi* terminales, pedunculo communi brevi incluso 10–18 cm. longi; flores purpurei (ex *Kerr*); pedicelli sub anthesin 4 mm. longi, post anthesin ad 1 cm. longi; bractae angustae, pedicellis fere duplo longiores; rhachis et pedicelli indumento ei ramulorum simili tecti. *Calyx* extra adpresse pallide vel ferrugineo-pilosus, intra glaber, 9 mm. longus; lobi postici breves, laterales 1.75 mm. longi, 3 mm. lati, breviter acute acuminati, antico lateralibus simili nisi paululo longiore, omnibus ciliatis. *Vexillum* cuneatum, 13 mm. longum, 5.5 mm. latum, apice emarginatum, basi in unguem vix distinctum angustatum, inferne puberulum; alae oblongae, apice obtusae, basi latere altero auriculatae, altero vix auriculatae, ungui sat lato circa 5 mm. longo incluso 13 mm. longae, 3.5 mm. latae; carina basi auriculata, apice rotundata, ungui 5 mm. longo incluso 13 mm. longa, 4 mm. lata. *Stamina* basi inter se breviter cohaerentia, inferne puberula. *Ovarium* 5 mm. longum, sericeum, stipite 2 mm. longo glabro suffultum. *Legumen* generis, ad 15 cm. longum, indumento ei ramulorum simili tectum.

Doi Chiengdao, 1600–2000 m., common in open savannah, *Kerr* 5578.

***Sophora exigua* Craib** [Leguminosae-Sophoreae]; species *S. violaceae* Thw., habitu similis sed foliis subtus ad costam tantum pubescentibus inter alia facile distinguenda.

Suffrutex circa 0.5 m. altus (ex *Kerr*); ramuli primo densius pallide vel fulvo-pubescentes, angulati, mox teretes, cortice cinereo vel stramineo oblecti, glabri, lenticellis conspicuis. *Folia* 13–15-foliolata, petiolo 3.5–9 cm. longo incluso 15–30 cm. longa, petiolo cum rhachi supra canaliculato indumento ei ramulorum simili tecto; stipulae minutae, deciduae; foliola inferiora subrotundata,

intermedia oblonga, superiora oblongo-oblancoolata, terminali oblongo-obovato vel obovato, apice rotundata, rarius truncata, saepe emarginulata, basi inferiora truncato-cordatula, superiora cuneata, ad 3 cm. longa et 1.6 cm. lata, subcoriacea, sicco viridia, subtus pallidiora, supra glabra, subtus ad costam pubescentia, aliter glabra, costa supra plus minusve immersa subtus prominente, nervis lateralibus utrinque 6-8 bene intra marginem anastomosantibus supra fere obscuris subtus conspicuis, nervulis pagina utraque obscuris, ciliata, petiolulo circa 2 mm. longo indumento ei ramulorum juvenilium simili tecto suffulta. *Racemi* terminales, pedunculo communi 3.5-6.5 cm. longo incluso 11-20 cm. longi; flores purpurei (ex *Kerr*), pedicellis 5 mm. longis suffulti; bracteae angustae, 3 mm. longae; rhachis, pedicelli et bracteae indumento ei ramulorum simili tecti. *Calyx* extra parce hirsutus, basi postice parum gibbosus, campanulatus, 6 mm. longus, lobis brevibus. *Vexilli* reflexi lamina rotundato-oblonga, apice emarginata, basi cuneata, 8 mm. longa, 7 mm. lata, nervis conspicuis bene intra marginem anastomosantibus, ungui 1 cm. longo basi puberulo suffulta; alae oblongae, apice rotundatae, basi biauriculatae, ungui 3 mm. longo incluso 13 mm. longae, basi 4 mm. latae; carinae petala oblonga, apice breviter obtuse acuminata, basi acuminato-subtruncato-auriculata, ungui 3 mm. longo incluso 10 mm. longa, 3 mm. lata. *Filamenta* ima basi inter se cohaerentia, complanata, ad 9 mm. longa, antheris parvis. *Ovarium* dense pubescens, 7 mm. longum, stipite 2 mm. longo suffultum, stylo pallido pilis perpauca divergentibus instructo, ovulis 7.

Udawn, Nawng Bua, 200 m., open deciduous forest, *Kerr* 8427a.

IX.—NOTES ON AFRICAN GRASSES, IV.* O. STAPF AND C. E. HUBBARD.

Rhytachne minor *Pilger* in Engl. Jahrb. LIV. 280. (1917).

An amplified description of this rare and interesting grass has been made possible by the addition of recent material from Sierra Leone.

Loosely tufted, glabrous annual. *Culms* very slender, erect or geniculately ascending, up to 30 cm. high, slightly compressed below, terete above, smooth, usually branched from about the middle, 3-4-noded, with the uppermost internode long exserted. *Leaf-sheaths* smooth, the lowermost more or less compressed and keeled, 1.5-2 cm. long, loose, persistent, the remainder narrow, tight, terete, shorter than the internodes; ligules truncate, about 0.5 mm. long, subauriculate, minutely ciliolate; lower and intermediate blades filiform, straight or flexuous, erect or spreading, tightly folded, 5-11 cm. long, up to 1 mm. wide when unfolded, smooth, the upper setiform and very short, sometimes reduced to

* Continued from *K.B.*, 1926, p. 446.

a small bristle on the sheath. *Racemes* solitary, very slender and fragile, erect, straight or slightly flexuous, 3-6 cm. long, 1-2 mm. wide, joints linear, about 2 mm. long, clavate and hollowed above, rounded on the back, slightly concave on the inner face, minutely and obscurely scaberulous, disarticulating horizontally, glabrous at the upper end; pedicels narrowly lanceolate-oblong, flattened, contiguous with the joint, obscurely nerved, margins minutely scaberulous. *Sessile spikelets* ovate-oblong, acute, 2-2.5 mm. long without the bristles, pale yellow. *Lower glume* transversely and very obscurely rugulose below the middle, 8-9-nerved, chartaceous, keels minutely scaberulous; bristle solitary, up to 2 mm. long; upper glume equalling the lower or very slightly shorter, boat-shaped, narrowly ovate when flattened, 3-nerved, thinly membranous, with a fine terminal bristle 2-3 mm. long. *Lower floret* empty; lemma narrowly ovate, obtuse, 1.8 mm. long, hyaline, obscurely 2-nerved, palea of similar shape and texture, but smaller. *Upper floret* $\frac{3}{4}$; lemma ovate-oblong, obtuse, 1.5 mm. long, hyaline, palea similar in shape and texture, but smaller. *Pedicelled spikelet* reduced to a bristle 2-3 mm. long.

TROPICAL AFRICA. Sierra Leone: Freetown, Nov., 1889, W. H. and A. H. Brown 71 (type); Brookfields, "Foni Flats," Deighton 2159!

Vern. Name: Fonɔ̃ (Mendi).

This very graceful species is nearest to *R. gracilis* Stapf, but differs from that species in having more slender, 3-4-noded culms, eciliate joints of the rhachis, smaller ovate-oblong spikelets and a typically single-awned lower glume. We have not seen Pilger's type, but his description agrees perfectly with Deighton's plant.

Triraphis longipes Stapf & Hubbard, sp. nov.; affinis *T. madagascariensi* Hook. f., sed multo minor, culmis laminisque brevibus gracilibus, paniculis parvis, spiculis purpureis differt.

Gramen perenne, caespitosum, 30-80 cm. altum. *Culmi* erecti, graciles, teretes, glabri et laeves, simplices, 3-4-nodi, nodis obscuris glabris. *Foliorum* vaginae tenuiter striatae, firmae, laeves, glabrae vel ore hirsutae, internodiis paulo longiores brevioresve, inferiores solutae, breves, persistentes, superiores arctae; ligulae brevissimae, truncatae, minute ciliolatae; laminae filiformes, convolutae vel involutae, 10-25 cm. longae, ad 0.75 mm. latae, paulo flexuosae, firmae, glabrae et laeves vel supra puberulae. *Panicula* ovata vel ovato-oblonga, 10-16 cm. longa, 4-8 cm. lata, effusa, valde laxa, purpurea; rhachis teres, scaberula; rami 1-2-nati, filiformes, stricti vel flexuosi, scaberuli; ramuli et pedicelli flexuosi, capillares, scaberuli; pedicelli 4-10 mm. longi. *Spiculae* solitariae, ovatae vel oblongae, 6-10 mm. longae, 2-3 mm. latae. *Gluma* inferior lanceolata, acuta vel acutissima, 1-1.3 mm. longa, enervia, glabra, hyalina; gluma superior lanceolata vel ovato-lanceolata, acuta vel acutissima, 1.9-2.2 mm. longa, glabra, enervia vel 1-nervia, hyalina. *Anthoecia* 4-7, laxe imbricata;



Fig. 1.

Fig. 1 *Rhytachne minor* Pilger, showing habit. A. Portion of raceme ($\times 8$). B. Lower glume ($\times 8$). C. Upper glume ($\times 8$). D. Pedicel with bristle-like rudimentary spikelet ($\times 8$).

Fig. 2.

Fig. 2. *Triraphis longipes* Stapf & Hubbard, showing habit. A. Spikelet ($\times 3$). B. Lower glume ($\times 10$). C. Upper glume ($\times 10$). D. Floret ($\times 7$). E. Lemma ($\times 7$). F. Palea ($\times 7$).

rhachillae internodia ad 1 mm. longa minute puberula; lemma ovato-oblongum, 3.5-4.3 mm. longum, bilobum et e sinu aristatum, lobis obtusis vel ob nervum breviter excurrentem brevissime mucronatis, arista gracili flexuosa patente vel recurva scaberula 8-13 mm. longa, tenuiter membranaceum, 3-nervium, e callo et versus margines longe albido-pilosum; palea lanceolata, obtusa vel truncata, 3-3.5 mm. longa, hyalina, carinis minute scaberulis. *Antherae* lineares, 1.8-2 mm. longae, purpureae.

TROPICAL AFRICA. Rhodesia: Salisbury, 1440 m., Eyles 2167 (type), 1555.

X.—DECADES KEWENSES PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM. DECAS CXVI.

1151. *Erythrocephalum microcephalum* Dandy [Compositae]; ob capitula parva circiter 1 cm. longa et flores omnes regulares facile distinguendum.

Herba erecta, ad 30 cm. alta; caulis parce ramosus, griseo-lanatus. *Folia* sessilia, anguste elliptico-lanceolata, basi subpandurata amplexicaulia, apice acuta, margine denticulata, majora 6-9 cm. longa et 1.5-2 cm. lata, tenuiter chartacea, supra setulis parce vestita et praesertim basi araneosa, subtus densissime griseo-lanata, nervis lateralibus adscendentibus. *Capitula* solitaria, ad 1 cm. longa et 0.8-0.9 cm. diametro; pedunculi 2-6 cm. longi, lanati. *Involucri* bractee lanceolatae, acutae, lanatae, circiter 0.6-0.7 cm. longae, exteriores margine omnino interiores apicem versus pectinatae. *Receptaculi* paleae lanceolatae, 0.7-0.8 cm. longae, membranaceae, apice breviter fimbriatae. *Flores* omnes regulares, 9-10 mm. longi. *Corolla* flava, tubulosa, superne abrupte dilatata profunde 5-loba, circiter 7 mm. longa, lobis linearibus circiter 2 mm. longis. *Antherae* circiter 2 mm. longae. *Ovarium* fere 2 mm. longum, pubescens; styli rami circiter 1 mm. longi. *Pappi* squamae anguste lineares, acutae, 3.5-4 mm. longae, breviter ciliatae, caducissimae.

TROPICAL AFRICA. Tanganyika: Mwanza, Davis 210.

1152. *Daphne Shillong* Banerji [Thymelacaceae]; affinis *D. Sureil* Smith et Cave (vide Records of the Botanical Survey of India Vol. VI. No. 2), autem ab illa quod discus hypogynus est minor differt (hic enim in *D. Sureil* maximus, quamquam in commentariis l.c. nulla eius fit mentio neque in tabula subiecta ostenditur); praeterea quod folia sunt angustiora, breviora, paullo magis coriacea, prope flores conferta denique quod pedunculi sunt breviores crassioresque, perianthium longius.

Etiam a *D. papyracea* Decne., bracteis minoribus magisque caducis, perianthio multo longiore, multo minus piloso differt.

Suffrutex parva, cortice lento, lenticulato, siccitate subfusca et rugosa; ramulis florentibus 2-3 cm. latis. *Folia* puncticulata, coriacea, siccitate subfusca, alterna et parvis intervallis per

ramulos, fasciculata, ad pedunculum stipata, anguste lanceolata, 5-6.5 cm. longa, 1.3 cm. lata, petiolis circa 0.8 cm. longis, basi atque apice acuta, basi obliqua, apice paullulum emarginata; supra et infra admodum glabrata, nervis satis manifestis. *Flores* albo-virides, parum odoriferi, parce capitati pedunculis brevissimis puberulis, terminalibus frondosis. *Bracteae* plus minus carinatae, sericeae, caducissimae, ita ut florum capita paene ebracteata videantur. *Perianthium* tubulosum, elongatum, 2.5 cm. longum, supra tenuiter canescens, lobis 4 extensis, late deltoideis, circa 0.8 cm. longis. *Scalae* 0. *Stamina* 8, duplici serie disposita; superiora ad perianthii fauces proxima, lobis opposita; inferiora altius inclusa, cum lobis alternantibus; *antherae* lineares, filamentis brevibus. *Ovarium* glabrum, uniloculare, uniovulatum; *stylus* brevissimus; *stigma* magnum, capitatum; ovula funiculata, anatropa, de summa cella pendula. *Discus* hypogynus, paene cupuliformis.

INDIA. Shillong, near Spread Eagles Falls, Sept., *Banerji* 465 (type), (in Herb. Kew., Calc., and Presidency College, Calcutta) Khasi Hills, October 1890, *Collett* without number (in Herb. Calc.).

The species was found growing at an altitude of 4550 ft. (by aneroid) in dense bush along a deep but narrow water-course running down a forest of *Pinus Khasya* Royle.

1153. *Pilea Kingii* Fischer [Urticaceae]; adhuc *P. Wightii* Wedd. var. *macrophylla* Hook. f., Fl. Brit. Ind., v. 555; *Urtica obesa* Wall. Cat. 4587; species a *P. Wightii* Wedd., satis distincta est: distinguitur foliis attenuato-cuspidatis, nec basi subcordatis, supra parce hirsutis, nec subtus punctatis, marginibus late dentatis, et enim sepalis obtusis, et acheniis rotundatis, obtusis.

Herba fere glabra. *Folia* opposita, per paris aequalia, membranacea, subrotunda vel ovato-lanceolata, attenuato-cuspidata, basi 3-costata acuta vel rotundata vel truncata sed nullo modo emarginata nec subcordata, 3-18 cm. longa, 2-11 cm. lata, supra parce hirsuta, subtus glabra, utrinque cystolithis admodum numerosis notata, marginibus valde late-dentata; costae laterales arcuatae, paullulo supra mediam partem laminarum incurvatae et deinde evanescentes; petiolis 1-8 cm. longi. *Stipulae* parvae, triangulari-lanceolatae. *Flores* monoeci, in cymis axillaribus foliis brevioribus compositi. *Sepala* ♂ 4, libera, aequalia, orbicularia vel suborbicularia, apice rotundata; ♀ 3, basi connata, inaequalia, dorsali longissimo, omnia rotundata. *Stamina* floris masculini 4. *Pistilloda* minuta, conica. *Staminodia* flores foeminei nulla. *Ovarium* rectum. *Achaenium* lateraliter compressum, ambitu orbiculare, apice rotundatum, laeve vel aliquo modo granulatum. *Semina* late ellipsoidea.

INDIA. Tinevelly, Courtallam, *R. Wight* 2684 (type); Nepal, *Wallich* Cat. 4587; Nilgiri Hills, Ochterlony Valley, Aug., *G. King*, Nedivattam, 6000 ft., June, *J. S. Gamble* 12091; S. Malabar,

Varadimalai, 4000 ft., Oct., *C. E. C. Fischer* 2371; Travancore, Kulkundal, Dec., *A. Meebold* 13100.

1154. **Cyperus Smithii** McClean [Cyperaceae]; affinis *C. albo-striato* Schrad., sed foliis bracteisque angustioribus crassioribus durioribus, spiculis angustioribus, et glumis ochraceis distinguitur.

Planta glabra. *Stolones* 0. *Culmi* 5-6 dm. longi, 2-3 mm. lati; triangulares acute robusti, costati, glabri, basi bulbacei, rhizomate obliqua conferti. *Folia* 1-4 dm. longa, 4-8 mm. lata, plana vel plicata, costata, marginibus scabridis, et venis tenuis transversis, carina distincta, prominente scabrida, glabra. *Vaginae* persistentes, scariosae, basi fibrosae. *Inflorescentia* umbellata, 12 cm. longa, 12 cm. lata; bractae circa 9-10, foliis consimiles, ad 40 cm. longae; radii primarii circa 30, breves, simplices, 1-paucis spiculis terminati, vel ad 8 cm. longi, radios secundarios breves vel longes ferentes; radii secundi, breves 1-3 spiculis vel elongati et radios tertianos ferentes; radii tertii 1-4 spiculis. *Spiculae* solitariae et pedicellatae vel 2-4 digitatae, 0.5-1 cm. longae, compressae, rufo-fuscae; glumae 10-30, imbricatae naviculares, ochraceae, lineis inaequalibus discolores basi truncatae, acuminatae, vel subacuminatae, carinis in mucro brevi acuto productis. *Rhachilla* compressa, non alata, marginibus crassis. *Nux* trigona. *Stylus* brevissimus; deciduus rami subsessiles nuce longiores.

TRANSVAAL. Pretoria District; on left bank side of Pienaars River in Baviaanspoort, growing between rocks, very common, about 400 ft. above river surface, *Smith* 347; growing in sheltered spots in Onderstepoort near Wonderboom, in damp soils, very common, forming patches, *Smith* 1748.

Belongs to subgenus *Pycnostachys* and is closely related to *C. albostriatus* Schrad. Differs from this species in having the leaves and bracts narrower, much thicker and tougher. Also the spikelets are narrower and the glumes are of a different colour.

1155. **Isachne gracilis** C. E. Hubbard [Gramineae]; affinis *I. polygonoidi* Doell, sed culmis erectis, panícula valde effusa, spiculis minoribus differt.

Gramen annuum. *Culmi* erecti, gracillimi, teretes, simplices vel inferne ramosi, glabri et laeves, 4-5-nodi, nodis glabris. *Foliorum* vaginae solutae, leviter striatae, internodiis breviores, membranaceae, glabrae et laeves vel sparse hirsutae, pilis e tuberculis minutis ortis indutae; ligulae nullae; laminae ovatae, acutae vel sub-acuminatae, basi rotundatae, 0.75-4 cm. longae, 2-13 mm. latae, planae, molles, pallide virides, glabrae, utrinque et ad margines minute asperulae. *Panícula* ovata vel oblonga, 1.5-7.5 cm. longa, 0.6-4 cm. lata, valde effusa, gracillima, viridis; rhachis glabra, laevis; rami solitarii, ad 2 cm. longi, patentes, stricti vel leviter flexuosi, filiformes, laeves; pedicelli capillares, glabri et laeves, 1-2.5 mm. longi. *Spiculae* solitariae, globosae, 1 mm. longae, virides. *Glumae* similes, delicate membranaceae, sparse

setosae; inferior elliptico-ovata, obtusa, 0.8-1 mm. longa, obscure subquiquennervia; superior late elliptica, rotundato-obtusa, obscure 5-nervia. *Anthoecium inferum* vacuum; lemma ellipticum, obtusum, 1 mm. longum, membranaceum, obscure 7-nervium, glabrum; palea ovata, subacuta, 1 mm. longa. *Anthoecium superum* breviter stipitatum; lemma orbiculatum, plano-convexum, 0.75 mm. longum, coriaceum, pubescens, pilis brevibus adpressis obtusis albis indutum; palea late elliptica, coriacea. *Caryopsis* plano-convexa, 0.6 mm. longa.

INDIA. Mysore: Baba Budan Hills, Santaveri, 4000 ft. in deep shade on rocks, *Meebold* 10781.

1156. *Panicum Kerrii* C. E. Hubbard [Gramineae]; affinis *P. obscuranti* Stapf, sed culmis altioribus erectis, foliorum vaginis multo longioribus latioribusque flaccidis, laminis longioribus convolutis differt.

Gramen annuum. Culmi 1.3-1.8 m. alti, validi, teretes, glabri et laeves, simplices, 3-4-nodi, nodis glabris et internodiis inferioribus turgidis. *Foliorum vaginae* inferiores ad 38 cm. longae, persistentes, internodiis longiores, latae, solutae, flaccidae, glabrae, laeves et nitidae, superiores angustiores et tenuiores, striatae, sparse hirsutae, pilis albis erectis e tuberculis fuscis ortis indutae; ligulae ad seriem ciliolum reductae, pilis densis albis ad 5 mm. longis; laminae convolutae, cylindricae, 50-80 cm. longae, applanatae 5-6 mm. latae, fere glabrae, firmae, costa media valida, supra prominente nervosae, nervis asperulis, marginibus sparse scaberulis. *Panicula* amplissima, 70-100 cm. longa, 15-25 cm. lata, oblonga, valde laxa; rhachis unisulcata, glabra, inferne laevis, superne scaberula, internodiis inferioribus 20-28 cm. longis, nodo infimo piloso; rami 1-3-nati, ad 30 cm. longi, erecti vel patentes, angulati, scaberuli; ramuli flexuosi, filiformes, scabridi, purpurei; pedicelli 2-nati vel solitarii, 1-3 mm. longi. *Spiculae* oblongae vel ovato-oblongae, 3.5-4 mm. longae, pre anthesin tenuiter acuminatae, demum hiantes, glabrae. *Gluma inferior* 3-3.2 mm. longa, ovata, acuminata, cuspidata, cuspe scaberula ad 0.75 mm. longa, 5-7-nervia, membranacea. *Gluma superior* 3.3-3.5 mm. longa, late ovata, acuta, breviter cuspidata, 5-7-nervia, membranacea. *Anthoecium inferum* sterile; lemma elliptico-ovatum, obtusum, 2.8-3 mm. longum, tenuiter membranaceum, 9-nervium; palea ovato-oblonga, obtusa, 2.3 mm. longa, hyalina, carinis scaberulis. *Anthoecium superum* ♂; lemma late ovatum, rotundato-obtusum, 2 mm. longum, 1 mm. latum, crustaceum, pallide luteum, nitidum, laeve; palea lemma similis sed angustior.

SIAM. Chantabun, Makām, 60 ft., in tufts at edge of open marshy grounds, *Kerr* 9581.

1157. *Leptaspis angustifolia* Summerhayes & Hubbard [Gramineae]; affinis *L. Banksii* R.Br., sed omnibus speciebus foliis linearibus satis distinguenda.

Gramen perenne ad 60 cm. altum. *Culmi* caespitosi e rhizomate brevi, erecti, simplices, enodi, modice graciles, teretes, tenuiter striati, leviter scaberuli. *Folia* radicalia; vaginae compressae, satis arctae, laeves, glabrae, nitidae, firmae, marginibus hyalinis, carinatae, carinis incrassatis; ligulae truncatae, brevissime ciliolatae; laminae breviter petiolatae, lineares, basi attenuatae, longe tenuiterque acutae, apice pungentes, 20-45 cm. longae, 4-10 mm. latae, glabrae, utrinque scaberulae, tenuiter venosae, inter venas transverse venulosae, glauco-virides; petiolus ciliatus. *Panicula* angustissima, 10-13 cm. longa, pauciramosa, erecta, stricta; rhachis teres, tenuiter striata, uno latere canaliculata, leviter scaberula; rami erecti, adpressi, 1.5-2.5 cm. longi, leviter scaberuli, paucispiculati. *Spiculae* remotae, brevissime pedicellatae; glumae ovatae, mucronatae, concavae, carnosulae, minute pubescentes, marginibus hyalinis, inferior 2 mm. longa, superior 3 mm. longa. *Spiculae* ♂; lemma, palea et stamina desunt. *Spiculae* ♀; lemma membranaceum, circiter 3 mm. longum, asymmetricum, dorsaliter gibbosum, minute subtomentosum, 9-costatum, album vel rubicundum, costis albis (Greenwood); palea linearis, obtusa, ad 2 mm. longa, carinis minute puberulis; ovarium pilosum.

FIJI ISLANDS. Vanua Levu: Lambasa, about 270 ft., Oct., Greenwood 550 (type); in mountains at about 1080 ft., Oct., Greenwood 548.

1158. **Pollinia Hendersonii** C. E. Hubbard [Gramineae]; affinis *P. sumatrensi* Ridley, sed laminis linearibus vel lineari-lanceolatis, panicula longa, articulis longioribus fere glabris et laevibus, arista lemmatis longiore differt.

Gramen annuum (?). *Culmi* ascendentes, ad 1.2 m. longi, teretes, glabri et laeves, inferne ramosi, 3-6-nodi, nodis fere glabris. *Foliorum* vaginae moderate solutae, tenuiter striatae, glabrae et laeves, internodiis longiores; ligulae truncatae, 1.5 mm. longae, rufescendo-membranaceae; laminae lineares vel lineari-lanceolatae, acuminatae, e basi attenuatae, ad 22 cm. longae et 1 cm. latae, patulae, firmae, utrinque appresse puberulae, marginibus scaberulis. *Racemi* 7-12, graciles, flexuosi, ad 15 cm. longi, pallide fusi, fere glabri; articuli spiculis longiores, circiter 6-7 mm. longi, fere glabri, marginibus obscure scaberulis. *Spiculae* sessiles lanceolatae, acutae, 4.8-5 mm. longae, callo brevissime hirsuto. *Gluma* inferior lanceolata, acuta, integra, carinis rigide ciliatis, dorso glabra et laevis sulcata; gluma superior ovata, acuta, subtrinnaria, nervis lateralibus tenuissimis, carina rigide ciliata, marginibus superioribus hyalinis ciliatis. *Anthoecium inferum* nullum. *Anthoecium superum* ♀; lemma ovatum, 1 mm. longum, hyalinum, 3-nervium, ex apice integro arista capillare ad 3.5 cm. longa instructum; palea lanceolata, obtuse acuminata, 1.8 mm. longa, enervia, hyalina. *Antherae* lineares, 2 mm. longae. *Spiculae pedicellatae* spiculis sessilibus similes. *Pedicelli* circiter 3 mm. longi, breviter ciliati. *Gluma* inferior 5-nervia. *Anthoecium*

inferum ad lemma reductum; lemma oblanceolatum, obtusum, 3.6 mm. longum, hyalinum, ciliatum, 1-nerviū.

MALAY PENINSULA. Pahang: Cameron's Highlands, Tanah Rata clearing, 4320 ft., *Henderson* 17940.

1159. *Iseilema siamense* C. E. Hubbard [Gramineae]; affinis *I. anthephoroidei* Hack., sed carinis spatharum propriarum dense tuberculatis, racemis fere glabris, spiculis involucrentibus oblique oblongo-lanceolatis, glumis inferioribus fere laevibus haud prominente costatis differt.

Gramen annuum (?). *Culmi* geniculato-ascendentes, circiter 15–18 cm. alti, graciles, inferne compressi, ramosi, glabri, laeves vel prope nodos minute tuberculati, multinodi, nodis glabris, internodiis exsertis. *Foliorum vaginæ* solutæ, breves, glabrae, membranaceae, carinatae, carinis tuberculatis; ligulae breves, truncatae, membranaceae, glabrae; laminae lineares vel lineari-oblongae, obtusae, 2–4 cm. longae, 4–5 mm. latae, patulae vel reflexae, glabrae, glaucescentes, marginibus sparse tuberculatis. *Panicula* angusta, 6–9 cm. longa, fere simplex; spathae propriae ovato-lanceolatae, 15–18 mm. longae, glabrae, carinis dense et minute tuberculatis; pedunculi 8–12 mm. longi, filiformes, glabri, apice minute tuberculati. *Spiculae involucrentes* 4, breviter pedicellatae, pedicellis inaequalibus 1.5 mm. et 2 mm. longis glabris laevibus; gluma inferior oblique oblongo-lanceolata, tenuiter acuta, 6–7 mm. longa, 1.5–1.75 mm. lata, chartacea, flavescens-viridis vel purpureo-suffusa, glabra, inferne laevis, superne leviter 12-costata, costis et carinis minute scaberulis; gluma superior oblique lanceolata, circiter 6 mm. longa, acuminata, laevis, 5-nervia, firme membranacea, marginibus inflexis hyalinis; antherodium sterile vel absens; lemma et palea oblanceolata, obtusa, circiter 1.6 mm. longa, delicate hyalina, enervia; lemma bilobum. *Spiculae pedicellatae* ♂ 2; pedicelli filiformes, 4–6 mm. longi, sparse scaberuli, pilis paucis albis e pallide tuberculis ortis hirsuti; spiculae lineares vel lineari-lanceolatae, acutae, 5–6 mm. longae, glabrae; gluma inferior multinervia, membranacea, carinis sparse tuberculatis; gluma superior 5-nervia, tenuiter membranacea; antherae lineares, 1.5 mm. longae. *Spicula subsessilis* ♀, basi pilosa, pilis albis 2.5 mm. longis induta, oblique lateque oblongo-lanceolata, 9 mm. longa, circiter 2.5 mm. lata; gluma inferior acuminata, 12-nervia, membranacea, inferne laevis, superne et ad carinas scaberula; gluma superior oblonga, longe acuminata, 3-sub-5-nervia, tenuiter membranacea, marginibus late inflexis hyalinis; lemma 3 mm. longum, bilobum, hyalinum, enerviū; palea linearis; arista gracilis, 2–2.5 mm. longa; caryopsis obovata, 3–3.5 mm. longa, 1.5–1.75 mm. lata, pallide fusca.

SIAM. Chaibadān, Menam Pasak, 150 ft., in bamboo jungle, *Kerr* 7980.

1160. *Stipa nitida* Summerhayes & Hubbard [Gramineae]; affinis *S. variabilis* Hughes, et *S. Drummondii* Steud., ab utraque specie

oribus vaginarum lanatis; ab illa panicula densiore ramis multispiculatis, spiculis minoribus, ab hac vaginis extra glabris, laminis tenuioribus, columna aristae scaberula haud pubescente differt.

Gramen perenne. *Culmi* caespitosi, erecti, usque ad 50 cm. alti, teretes, uno latere canaliculati, modice graciles, laeves, glabri, simplices, 2-3-nodi, nodis glabris rarius exsertis. *Foliorum* vaginae arctae, praeter os dense lanatum et margines sparsissime lanatos glabrae, scaberulae, tenuiter striatae, subauriculatae; ligulae ad seriem ciliorum reductae; laminae fere filiformes, in acumen longe attenuatae, 10-20 cm. longae, 0.5-1.0 mm. diametro, subrigidae, involutae vel convolutae, scabridae vel scabridopuberulae. *Panicula* recta, stricta, 15-30 cm. longa, usque ad 2 cm. lata, pallide viridis, nitida; rhachis compressa, laevis, exceptis nodis inferioribus lanato-pilosis glabra; rami erecti, adpressi, 2-3-nati, e basi ramosi, tenues, minute scaberuli, usque ad 6 cm. longi, spiculis numerosis; pedicelli erecti, scaberuli, 1-8 mm. longi. *Spiculae* lineari-lanceolatae, 10-12 mm. longae, pallide virides, nitidae. *Glumae* subaequales, tenuiter membranaceae, superne hyalinae, carinis scaberulis; inferior lineari-lanceolata, apice breviter aristata, plus minusve tridentata vel subintegra, subtrinervia, nervis lateralibus fere obsoletis; superior lanceolata, tenuiter acuminata, subquinquenervia. *Lemma* cylindricum, 4-5 mm. longum, sparse albo-pilosum, apice integro breviter ciliatoque, callo acuminato sericeo-piloso 1.5 mm. longo; arista falcata, in toto 4-6 cm. longa, nitida, columna scaberula, 7-10 mm. longa; palea linearis, obtusa, 3-3.5 mm. longa, dorso linea pilorum instructa; antherae lineares, 1.3 mm. longae.

SOUTH AUSTRALIA. Finnis Springs (S. of Lake Eyre), Aug. 25th, 1926, F. D. Warren.

Local Name: "Balcarra Grass."

XI.—CONTRIBUTIONS TO THE FLORA OF BURMA: II.* C. E. C. FISCHER.

***Shorea Buchananii* Fischer** [Dipterocarpaceae].

Since the publication of the original description (*K.B.* 1926, p. 458) fruits have come to hand.

Fruit subglobose, densely silky-tomentose, 6-7 mm. in diam.; wings subequal, ligulate or subspathulate, apex obtuse or acute, 1.6-2.5 cm. long, 0.4-0.6 cm. wide, ciliate, stellate-hairy (more densely so at the base) without, glabrous or nearly so within.

Myitkyina District, Pidaung Reserve, 500 ft., Jan., *Maung Mya* per C. E. Parkinson 2238.

***Shorea farinosa* Fischer** [Dipterocarpaceae].

Since the publication of the original description (*K.B.* 1926, p. 461) fruits have been received.

* Continued from *K.B.*, 1926, p. 468.

Fruit ovoid, apiculate, about 2 cm. long, minutely puberulous; wings slightly mealy; 3 longer linear-lanceolate, narrowed to a blunt apex, about 11 cm. long, 1.4–1.8 cm. wide, nerves prominent 13–15; smaller wings linear, acute, 6–7 cm. long, 0.5 cm. wide, nerves 7–9.

South Tenasserim. Thekyu chaung, Jan., *Maung Law Tek* per C. E. Parkinson 1381.

Vernacular name: *Uban* (Burmese).

***Walsura glauca* Fischer** [Meliaceae]; affinis *W. hypoleuca* Kurz, foliis majoribus nervis pluribus, petiolis costatis, floribus pedicellatis, ovariis glabris, stylis columnaribus differt.

Tree 80 feet high; young twigs compressed, fuscous pubescent. *Leaves* 5-foliate; petiole minutely pubescent or glabrescent, 5–8 cm. long, flat above with sharp edges which are almost winged at the base, terete and striate between the two pairs of lateral leaflets, enlarged and subamplexicaul at base, swollen and rugose at the insertions of the leaflets. *Leaflets* opposite, narrowly elliptic to broadly oblong, obtuse or apiculate, base rounded or acute, 11–20 cm. long, 3.5–7 cm. wide, the apical leaflet the largest, the basal pair the smallest, glabrous and shining above, glaucous below, midrib slightly raised above, prominent and yellowish- or reddish- brown below, primary nerves 10–11 pairs, distinct above, prominent below, secondary nerves transverse, margin slightly revolute, narrowly cartilaginous, more or less undulate, petiolules terete, minutely pubescent or glabrescent, swollen and rugose at both ends, of the lateral 1–1.5 cm. long, the apical 2–3.5 cm. long. *Inflorescence* in terminal panicles, about as long as the upper leaves; rhachis sulcate, fuscous pubescent, bracts at the main divisions early deciduous (not seen) leaving scars, bracteoles at the ultimate divisions linear, blunt, 1.5 mm. long, whitish silky-pubescent without, glabrous within, ciliate. *Flowers* about 5 mm. long and wide. *Pedicels* 2–3 mm. long, slightly angled, fuscous-pubescent. *Sepals* shortly united at the base, triangular-ovate, subacute, 2 mm. long, fuscous-pubescent without, glabrous within. *Petals* 5, narrow-oblong, obtuse, 4–5 mm. long, whitish- or fuscous-pubescent on both sides, white. *Stamens* 10, subequal, about 3 mm. long; filaments linear, flat, shortly united at base, densely white-hairy; anthers subglobose, glabrous, connective not produced. *Disk* annular, fleshy, glabrous. *Ovary* short, imbedded in the disk, glabrous; style columnar, slightly angled, 2 mm. long, glabrous; stigma capitate. *Fruit* not seen.

South Tenasserim, Kalin kwan chaung, 200 ft., Feb., C. E. Parkinson 1686.

***Xerospermum ferrugineum* Fischer** [Sapindaceae]; a *Xerospermis* reliquis foliis 4-jugatis differt.

Tree 60 feet high and 3–4 feet in girth, with dense foliage; twigs terete, densely villous with long, ferruginous, stellate hairs and linear and elliptic, corky lenticels. *Leaves* alternate, paripinnate,

4-jugate; rhachis terete, 8-20 cm. long, indumentum as of the twigs, base enlarged, semi-amplexicaul; leaflets opposite or subopposite, sometimes almost alternate, elliptic or elliptic-lanceolate, acutely acuminate, base inequilateral, rounded, sometimes emarginate on one side, lowest pair smallest and enlarging upwards, 6.5-14 cm. long, 2.5-5 cm. wide, glabrous above except the fuscous stellate-villous midrib, softly villous with stellate ferruginous and simple fulvous hairs on the nerves and veinlets below, midrib impressed above, prominent below, primary nerves 13-20 pairs, subprominent below, regular, nearly horizontal, secondary nerves reticulated, margins narrowly cartilaginous, slightly undulate; petiolules terete, 3-4 mm. long, villous like the rhachis. *Inflorescence* of terminal dense panicles as long as the leaves, main rhachis stout, striate, densely villous with golden-ferruginous stellate hairs, bracts linear, densely ferruginous-villous on both sides. *Flowers* aggregated on short branchlets, shortly pedicelate, 5 mm. long and wide. *Sepals* 5, imbricate in 2 rows, subequal, rotund-oblong, slightly concave, about 3 mm. long, 2.5 mm. wide, densely brown stellate-tomentose on both sides. *Petals* 5 (rarely 6), spathulate or obovate, shortly clawed, about 5 mm. long, densely shaggy with long whitish hairs except the claws and a glabrous area at the rounded apex outside, white. *Stamens* 8 (rarely 9), inserted within the disk, 4-5 mm. long; filaments filiform, densely villous with long whitish hairs; anthers sagittate, apiculate, nearly 1 mm. long, glabrous. *Disk* annular, fleshy, somewhat lobed, thicker on one side, densely villous with brownish stellate and simple hairs. *Pistil* villous, minute, sunk in the disk and concealed by the hairs; ovary 2-lobed, 2-celled, cells 1-ovuled; style central, stout, about as long as the ovary-lobes stigma 2-toothed. *Fruit* not seen.

South Tenasserim, Kyein chaung forests, 200 ft., Feb., C. E. Parkinson, 1671.

Vernacular name: *Mai Kasan* (Shan).

***Guioa spathulata* Fischer** [Sapindaceae]; affinis *G. fusciculata* (Kurz) Radlk., sine tomento ferrugineo, folioliis majoribus glabris, floribus majoribus, petalis spathulis differt.

Tree 80 feet high; stem much buttressed; twigs pale-brown, minutely puberulous. *Leaves* alternate, paripinnate; rhachis 7-10 cm. long, terete below, 2-costate or very narrowly 2-winged upwards, striate, glabrous or nearly so, petiole swollen and rugose at the base; leaflets 2-3 pairs, opposite or subopposite, membranous, elliptic or oblanceolate-elliptic, slightly falcate, acuminate, apiculate, base acute, inequilateral, 7-16 cm. long, 3-6 cm. wide, the terminal pair the largest, glabrous, minutely and copiously pellucid-punctate, midrib raised on both sides, primary nerves 5-6 pairs prominent below, ascending, curved, reticulations distinct below; petiolules 3-5 mm. long, more or less rugose. *Inflorescence* of axillary or extra-axillary racemes or racemose cymes, subtended by 1-several minute, grey-puberulous bracts; rhachis angled,

3-4 cm. long, thinly grey-puberulous, with small grey-puberulous bracteoles at the divisions. *Flowers* pedicelled, about 6 mm. long and wide, greenish, each subtended by an ensiform, densely grey-pubescent bracteole about 2 mm. long; pedicels 0.8-1.3 cm. long, jointed well below the middle, slightly enlarged below the flower, thinly grey-puberulous. *Sepals* 5, imbricate in 2 rows, free, sub-orbicular or oblong, the outer wide, about 4 mm. long, thinly grey-pubescent outside, the 2 inner and the apices of all rather more densely so, glabrous within, grey ciliate. *Petals* 4, broadly spatulate, nearly as long as the sepals, with fine silky, whitish hairs on the claw and the lower half of the blade outside, glabrous within, the inner face bearing a large, 2-crested scale nearly as long as the petal and adnate to it for about half its length, the scale thinly whitish hairy below and ciliate and with a dense brush of long, white hairs along the upper margin, the crests glabrous. *Disk* disciform, slightly thicker anteriorly, densely short-hairy. *Stamens* 7, inserted within the disk, 3-3.5 mm. long; filaments subulate or subulate-ensiform, tapering to a filiform apex, densely whitish, silky-hairy except the filiform tail; anthers minute, cordate, bluntly apiculate, glabrous. *Ovary* sessile, ovoid, sub-trigonus, subgibbous anteriorly, about 5 mm. long (including the subulate style), grey felted, 3-celled, cells 1-ovuled; stigma undivided, glabrous. *Fruit* (not seen) "fleshy, 3-angled" (fide Parkinson).

South Tenasserim, Ngawun Valley, 300 ft., Jan., C. E. Parkinson 1618.

Vernacular name: *Ka Pu Oung Ret* (Shan).

Mangifera Parkinsonii Fischer [Anacardiaceae]; affinis *M. pentandrae* Hook. f., ramulis nigris, foliorum nervis pluribus, paniculis glabris, petalis non costatis differt.

A large tree; twigs nearly black when dry, sulcate, glabrous. *Leaves* alternate, crowded near the ends of the branchlets, chartaceous, linear-oblong, tapering to a blunt apex, base acute, sometimes inequilateral, 10-23 cm. long, 2.5-6.5 cm. wide, quite glabrous, olivaceous above, pale below when dry, midrib stout, prominent and blackish below, primary nerves 15-25 pairs, slightly raised above, distinctly so below, forming a wide angle with the midrib, slightly curved, terminating at the margin, ultimate reticulations fine, distinct on both faces, margins narrowly cartilaginous; petioles terete, wrinkled when dry, slightly swollen and rugose at the base, 3-5 cm. long, glabrous. *Inflorescence* in axillary cymes and terminal panicles; rhachis slender, wrinkled when dry, glabrous, dark; bracts and bracteoles deciduous. *Buds* subglobose. *Flowers* pedicelled, polygamous; pedicels 1-1.5 mm. long, glabrous, jointed near the base. *Calyx* campanulate, about 1.5 mm. long in ♂, 3 mm. long in the ♀, glabrous, lobes 5, imbricate, sub-orbicular, shorter than the tube, margins subhyaline and minutely, sparsely ciliate. *Petals* 5, attached to the lobes of the disk,

oblanceolate to obovate, 3 mm. long in ♂, 4 mm. long in the hermaphrodite, with crisped, whitish hairs on both faces, especially near the apex, ciliate, veins indistinct, without thickened ribs. *Disk* deeply 5-lobed in the ♂, indistinctly so in the ♀, glabrous. *Stamens* 5, all perfect, inserted on the lobes of the disk, about $\frac{1}{2}$ the length of the petals in the ♂, smaller in the ♀. *Pistil* rudimentary. *Ovary* seated on the disk, dome-shaped, slightly compressed, 1 mm. long, sparsely hairy, 1-celled, ovule single, basal; style lateral, short, stout; stigma capitate. *Fruit* not seen.

South Tenasserim, Kyein chaung forests, 200 ft., Feb., C. E. Parkinson 1674.

Vernacular name: *Mai Ka Peep* (Shan).

***Bauhinia sulphurea* Fischer** [Caesalpiniaceae]; affinis *B. bracteatae* Grah., foliorum nervis pluribus, lobis obtusis, floribus sulphureis differt.

A cirrhone climber; young twigs slightly zigzag, sulcate, densely velvety with chocolate-coloured tomentum, later becoming greyish-brown. *Leaves* suborbicular to ovate-oblong, but little narrowed upwards, bilobed to about half way down or a little more with a very narrow sinus or sometimes with the lobes overlapping, lobes rounded, base shallowly cordate, 6-9 cm. long, 5.5-8 cm. wide, 11-13 ribbed, glabrous above with dark basal areoles (midrib above long-hairy when young), more or less densely red-brown hairy below, especially on the ribs and nerves. *Petioles* terete, densely grey- or chocolate-brown tomentose, 2-4.5 cm. long. *Tendrils* slender, opposite or alternate from the lower floral bracts, circinnate, densely chocolate-tomentose, becoming woody and grey-brown, up to 10 cm. long. *Inflorescence* in axillary racemes and terminal paniced racemes, rhachis densely chocolate-velvety, many-flowered, each flower subtended by a chocolate-velvety, lanceolate bract, 6-7 mm. long. *Buds* ovoid, blunt, 1-2 cm. long, 0.6-0.7 cm. wide. *Pedicels*, slender, 6-8.5 cm. long, densely greenish-yellow tomentose, with a pair of opposite or subopposite, shaggy, linear bracteoles about 6 mm. long. *Flowers* about 4 cm. in diam. *Calyx* thick, tube very short, lobes 2, oblong, rounded, densely greenish-yellow tomentose without, glabrous within, about 1 cm. long. *Petals* clawed, the lamina broadly hastate-ovate, apex and basal angles rounded, margins crisped, the claws and outer faces of the blades, except the margins, shaggy with long, silky, greenish-yellow hairs, blades within glabrous, yellow, palmately veined with fine purple lines, 2.5-3.5 cm. long, about 1 cm. wide, the claws of the 2 anterior petals up to 2.5 cm. long, the rest somewhat shorter. *Stamens* 9, 2 anterior alone perfect, with somewhat flattened, curved or nearly straight filaments, rather longer than the claws of the corresponding petals; filaments yellow-pubescent below, glabrescent above; anthers versatile, elliptic, glabrous, 3-4 mm. long; 7 posterior stamens with flattened, usually straight, glabrous filaments 0.5-1 cm. long, with imperfect, rounded or oval

anthers. *Gynoecium* curved, densely shaggy with long, silky, brownish hairs, 1.8 cm. long, the gynophore 6 mm. long; ovary flattened, about 5 mm. long; ovules 5, subglobose; style subulate, about 6 mm. long, hairy to just below the small, capitate stigma. *Legume* (immature) flat, oblanceolate or oblanceolate-oblong, apex acute or truncate, cuspidate, base narrowed into a stout stalk about 1 cm. long, 10-13 cm. long, 3-3.5 cm. wide, densely chocolate to ferruginous-tomentose at first, glabrescent, finely reticulately veined.

South Tenasserim, Theinkun chaung banks, 100 ft., Feb., C. E. Parkinson 1918 (type); Swe Daw, banks of the Tenasserim River, about sea-level, Feb., C. E. Parkinson 1951.

Vernacular name: *Swe Daw* (Burmese).

***Bauhinia fusifera* Fischer** [Caesalpiniaceae]; affinis *B. polycarpae* Wall., alabastris anguste fusiformis acuminatis, petalis angustioribus apice basique acuminatis, venulis ascendentibus differt.

An erect or climbing *shrub* or *undershrub*, ecirrhose. *Leaves* suborbicular, more or less deeply cordate, lobed nearly half way down, lobes obtuse, quite glabrous above, more or less puberulous beneath, especially on the nerves, 9-ribbed, midrib prolonged beyond the blade into a seta 2-4 mm. long, 5-11 cm. in diam. *Petioles* 3-5 cm. long, channelled above, with scattered pubescence, apical portion terete and more or less densely pubescent. *Stipules* narrow-ensiform or setaceous, 3-4 mm. long. *Inflorescence* of leaf-opposed racemes longer than the petioles, many-flowered; rhachis terete, puberulous, an ensiform bract subtending each flower. *Buds* narrowly fusiform, acuminate at both ends, apex minutely 5-toothed, 5-angled, sparsely pubescent. *Flowers* about 1 cm. long; pedicels short, pubescent, with 2 minute, ovate bracteoles at the apex. *Calyx* spathaceous, splitting down one side, tubular portion 3-4 mm. long, limb 7 mm. long, sparsely pubescent without, glabrous within. *Petals* 5, inserted on the rim of the calyx-tube, spatulate with an inflexed acute point, quite glabrous, 8-9 mm. long, 2.5-3 mm. wide, white. *Stamens* 10, all fertile, glabrous, alternately long and short; filaments filiform, 2.5-6 mm. long; anthers equal, versatile, oblong, about 2 mm. long, connective very minutely produced. *Ovary* borne on a terete, glabrous gynophore about 3 mm. long arising from near the base of the calyx-tube, linear, sparsely hairy, about 2 mm. long, shorter than the shortest stamen; style short; stigma capitate; ovules 6. *Legume* (immature) strap-shaped, acuminate at both ends, glabrous, finely reticulate, about 8 cm. long, 1 cm. wide, 6-seeded, carpophore and pedicel each 5 mm. long, the latter pubescent.

Mandalay District, Maymyo Road, 1500 ft., July, C. E. Parkinson 1571 (type); Gokteik Gorge, 1800 ft., August, J. H. Lace, 4146 (type for fruit); Northern Shan States, "Zinbingyi to Thondang," 1500-2400 ft., July, J. H. Lace 5379.

A bud in *Lace* 5379 was found to have no anthers, 6 filaments being present with a normal gynoecium.

Bauhinia Parkinsonii *Fischer* [Caesalpinaceae]: affinis *B. polycarpae* Wall., pedicellis longis, calyce glanduloso, petalis unguiculatis differt.

A scandent, ecirrhose *shrub*; twigs zigzag, slightly angular, sulcate, minutely brown-pubescent. *Leaves* broader than long, deeply cordate with a wide sinus, 2-lobed nearly half way down, lobes rounded, 11-ribbed, the lowest pair very close to the margin, midrib prolonged beyond the blade into a brown arista about 3 mm. long, glabrous above with scattered, minute, white hairs and dotted with red-brown or dark-brown glands below, 5-9 cm. long, 6-11 cm. wide. *Petioles* channelled above except at the base and apex which are terete and minutely brown-pubescent, 1.5-2.5 cm. long. *Stipules* minute, setaceous, early deciduous. *Inflorescence* of leaf-opposed racemes longer than the petioles, minutely brown-pubescent; rhachis with fine decurrent ribs from the insertions of the flowers, an ensiform, finely aristate, brown-tomentose bract 1 mm. long at the base of each pedicel. *Pedicels* terete brown-pubescent, about 9 mm. long in flower. *Bud* broadly clavate, obtuse, up to 6 mm. long. *Calyx* spathiform, splitting into 2 broadly ovate lobes, spreading in flower, saccate at the base, tubular portion funnel-shaped with thick walls and thickened mouth, 2 mm. long, lobes 3 mm. long, apices blunt, glabrous within, brown-silky without and dotted with minute, red-brown glands. *Petals* 5, lanceolate to broadly spatulate above, clawed below, apex rounded, 6-7 mm. long, 3 mm. wide, claw about 2 mm. long, glabrous, white. *Stamens* 10, all fertile, in 2 rows on the mouth of the calyx-tube within the petals, glabrous; filaments filiform, tapering, 5-6 mm. long, the inner five shorter; anthers versatile, subequal, oblong, about 1 mm. long. *Gynoeceum* shorter than the stamens, brown-silky and dotted with red-brown glands; gynophore from the base of the calyx-tube and about equalling it in length; style short; stigma small, capitate; ovules 3-4. *Fruit* not seen.

Mandalay District, Maymyo Road, 1500 ft., July, C. E. Parkinson 1572.

Bauhinia velutina (Wall.) J. G. Baker in Fl. Brit. Ind. ii, 280.

Baker's description of this species is rather meagre and the presence of glands is not mentioned though they occur in the type (Wall. Cat. 5781) and in all others in the Kew Herbarium. It seems advisable, therefore, to publish an amplified description. Baker states that it has the "habit of *B. purpurea* and *B. variegata*", i.e. a middle-sized, erect tree. The evidence for this is not stated and there is nothing in the type or other specimens to support the statement except the absence of tendrils. On the other hand, Mr. Parkinson definitely states that his specimens are from a climber.

A *climber*; branchlets brown, sulcate, with scattered, small, rounded, corky warts, grey or fuscous-pubescent with numerous small, reddish- or yellowish-brown glands. *Leaves* coriaceous,

broader than long, lobed from $\frac{1}{4}$ – $\frac{1}{3}$ of the way down, lobes rounded and well separated, base shallowly to deeply cordate with a wide sinus, 9–11-ribbed, 5–10 cm. long, 6.5–11.5 cm. wide, primary nerves rather regular, transverse between the ribs, reticulations obscure, thinly grey-pubescent, sometimes glabrescent, above (more densely so and fuscous on the basal areolas), whitish pubescent (fuscous on the ribs, nerves and basal areolas) below, dotted more or less thickly with reddish- or yellowish-brown glandular papillae. *Petioles* subquadrangular in section, 1.5–3 cm. long, densely fuscous pubescent, with or without glands. *Inflorescence* in leaf-opposed and terminal racemes up to 15 cm. long; rhachis rather stout, slightly angled, fuscous pubescent, sometimes glandular; bracts and bracteoles small, broadly ovate, acute; pedicels short. *Buds* linear, obtuse. *Calyx* densely grey-pubescent and reddish- or yellowish-brown glandular papillose without, tubular portion linear, 5-angled upwards, about 2 cm. long, lobes 5, linear, reflexed, 3–4 cm. long. *Petals* elongate-spathulate, apex rounded, tapering into a softly hairy, ciliate claw, the rest of the petal glabrous or with a few scattered hairs, 4.5–5 cm. long, about 1 cm. wide, claw broad, about 2.5 cm. long; petals reddish-pink with yellow bases and margins. *Stamens* 3 perfect, glabrous, filaments linear, finely acuminate, 3.5–4.5 cm. long; anthers linear, about 1.2 cm. long, versatile, apex obtuse, shortly sagittate at base, ventrally with long, scattered white hairs. *Gynoecium* 5–6 cm. long, densely grey-tomentose with scattered reddish-brown glandular papillae above; gynophore from the base of the calyx-tube, grey-brown tomentose and glandular; ovary about 1.2 cm. long with a stalk 1.7 cm. long; ovules 6, flat, ovate in outline; style narrow-ensiform, 1.5–2.5 cm. long; stigma not enlarged. *Legume* strap-shaped, widened a little below the apex, acute at both ends, terminated by the persistent style, sutures slightly thickened, tomentose and densely reddish-brown glandular-papillose, about 13 cm. long, 2 cm. wide, stalk about 2 cm. long.

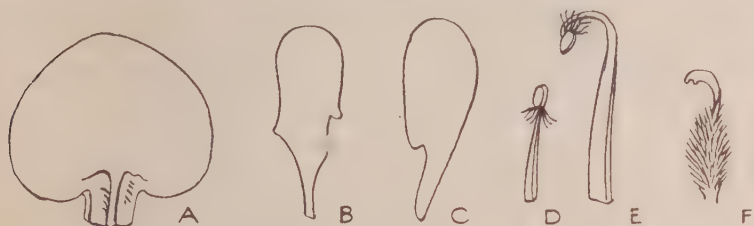
South Tenasserim, Ngawun chaung forests, 300 ft., Jan., C. E. Parkinson 1631.

Vernacular name: *Tang Daw* (Shan).

***Ormosia Watsonii* Fischer** [Papilionaceae] ; similis *O. robustae* Wight sed foliis obtusis minoribus, calycis crassi lobis latis subacutis, petalis lateralibus angustis, antheris brevibus basi barbellatis differt.

Tree 80 feet or more high; twigs thick, sulcate, densely brown-tomentose. *Leaves* alternate or subopposite, imparipinnate; petioles 3.5–4 cm. long, swollen at the base, densely brown-tomentose; rhachis about 9 cm. long, shortly produced beyond the apical pair of leaflets, densely brown-tomentose; stipules deciduous (not seen). *Leaflets* 9, chartaceous, olivaceous when dry, oval or ovate, narrowed slightly to the rounded or retuse apex, base rounded, 6–11 cm. long, 3.5–5 cm. wide, glabrous and shining above, brown-

pubescent or tomentose on the nerves below, midrib channelled above, prominent below, primary nerves about 9 pairs, distinct above, prominent below, reticulations fine, distinct on both faces; petiolules stout, about 5 mm. long, the terminal somewhat longer, brown-tomentose; stipels 0. *Inflorescence* in terminal, pyramidal, paniced racemes about 12 cm. long; rhachis and its branches stout, densely brown-tomentose; bracts lanceolate, 3-4 mm. long, densely brown-tomentose. *Flowers* about 1.3 cm. long and nearly as wide; pedicels about 5 mm. long with 2 minute, opposite, medially fixed, lanceolate bracteoles, all densely brown-tomentose.



Ormosia Watsonii Fischer. A. standard; B. lateral petal; C. keel petal; D. short stamen; E. long stamen; F. pistil (all $\times 2$).

Calyx thick, leathery, campanulate, about 1 cm. long, 5-lobed about $\frac{1}{2}$ way down, densely brown-tomentose on both sides except on the margins, lobes triangular, subacute, the 2 upper connate to just below the apices. *Petals* 5, about equal in length, white; standard orbicular-reniform, about 1.3 cm. long, with 2 fleshy callosities at the base and a short, very broad claw, quite glabrous; lateral petals oblong-spathulate, subauricled, clawed, with a few scattered white hairs on the back, keel petals free, inequilateral, obovate, auricled on one side, clawed, with a line of brownish hairs down the back. *Stamens* 10, free, unequal, 0.8-1.3 cm. long, filaments subulate, glabrous, enlarged at the base, somewhat quadrangular; anthers small, oval, versatile, longitudinally dehiscent, more or less bearded at the base. *Ovary* ellipsoid, very shortly stipitate, about 7 mm. long, densely brown-villous; ovules 2; style flattened and usually twisted in flower, about 5 mm. long, glabrous, curved and bent over at the apex with 2 stigmatic papillae on the face turned downwards. *Fruit* not seen.

South Tenasserim, Victoria Point, 300 ft., March, C. E. Parkinson 2063.

Vernacular name: *Le-zin* (Burmese). Named in honour of Mr. H. C. Watson, Conservator of Forests, Burma, at the request of Mr. Parkinson.

***Barringtonia cymosa* Fischer** [Lecythidaceae]; species sectioni *Stravidio* congruit sed ab aliis specibus differt inflorescentia erecta *cymosa* foliis breviora, ovulis medio dissepimento insertis.

Tree 30-40 ft. high; branchlets slender, terete, at first minutely

brown-puberulous, later glabrous and pale-brown to grey. *Leaves* elliptic or oblong-lanceolate, acutely acuminate, base tapering into the 1-1.5 cm. long petiole, quite glabrous, 15-35 cm. long, 5-10 cm. wide, midrib prominent below, primary nerves 12-19 pairs (according to length of the leaf), regular, arching and anastomosing near the margin, prominent below, secondary nerves obliquely transverse between the primary, ultimate reticulations fine, indistinct, margins minutely sinuate-denticulate. *Inflorescence* terminal, erect, of simple or branched cymes 6-11 cm. long; rhachis and its branches striate, minutely brown- or fuscous-puberulous, becoming tomentose at the extremities; bracts at the divisions small, ovate, puberulous, deciduous. *Flowers* aggregated towards the ends of the cyme-branches. *Buds* subglobose, about 1 cm. in diam. just before expansion. *Pedicels* 6-10 mm. long, fuscous-tomentose, medially articulated, with a minute bracteole at the articulation. *Calyx* clavate, 5-6 mm. long, fuscous-tomentose without, lobes semi-circular, ciliate, glabrous within, 2 mm. long. *Petals* broadly ovate to orbicular, about 1.2 cm. long, glabrous, deep pink, not firmly adhering to the staminal tube. *Stamens* very many, all antheriferous, glabrous, tube short, filaments deep pink, up to 2.7 cm. long; anthers yellow. *Ovary* 2-celled (becoming 1-celled); ovules 2 in each cell, attached to the middle of the dividing partition, only 1 of the 4 maturing; style filiform, as long as the stamens, glabrous, deep pink; stigma small, clavate. *Fruit* not seen.

South Tenasserim, near Negya Daung Pass, 600 ft., Feb., C. E. Parkinson 1682.

Vernacular name: *Le Ku Maw* (Karen).

Greenea Parkinsonii Fischer [Rubiaceae]; affinis *G. Wightianae* W. & A., floribus pedicellatis, gemmis clavatis obtusis, corollis brevioribus sed latioribus differt.

A small tree. *Leaves* chartaceous, oblanceolate, apex long acuminate or subcaudate, acute, base tapering, more or less decurrent on the petiole, margins entire, sometimes sinuate towards the apex, glabrous above, pubescent on the midrib, nerves and veins beneath, midrib strong and prominent, especially below, primary nerves 20-25 pairs, prominent, parallel, arching near the margin, secondary nerves curving transversely between the primaries, venules finely reticulate, upper surface dark green, lower paler (at least when dry), up to 32 cm. long and 8 cm. wide. *Petioles* slender, more or less densely short-hairy, slightly incrassate at the base, 1.5-3 cm. long. *Stipules* interpetiolar, lanceolate, apex blunt or acute, densely grey-brown hairy without with more or less appressed short hairs, glabrous within except at the base, corners of the base of the opposite pairs in contact, 1-1.5 cm. long. *Inflorescence* terminal of paniced scorpioid cymes, up to 25 cm. long and broad; rhachis densely appressed grey-pubescent, bracts at furcations linear, densely pubescent, 5-7 mm. long but occasionally at the primary divisions leaflike and 6 cm. or more long

including the petiole. *Flowers* regularly spaced, bracteole one, minute, linear; often at a little distance from the pedicel. *Pedicels* about 1 mm. long, pubescent. *Buds* clavate, obtuse. *Calyx* subglobose, hispid pubescent, teeth 5, equal, triangular, subacute, about $\frac{2}{3}$ length of tube. *Corolla* wide funnel-shaped, about 3 times longer than the calyx, white, 6-7 mm. long and nearly as wide at the mouth, thinly mealy without, glabrous within except on the lobes; lobes 5, short, broadly triangular, obtuse, more or less densely mealy-pubescent within. *Stamens* 5, included, filaments short, filiform, inserted about the middle of the corolla-tube; anthers versatile, linear-oblong. *Ovary* 2 celled; ovules crowded on a rounded placenta; style filiform, glabrous, stigmas 2 revolute, very slightly exserted. *Capule* subglobose, hispid, surmounted by the persistent calyx teeth, crown flat, 3 mm. in diameter; seeds very many, flat, in outline anvil shaped with 2 sides straight and at right angles to each other.

Myitkyina District, Nawiaw chaung, Dec., C. E. Parkinson 404.

The shapes of the buds and open flowers are strikingly different in this species and in *G. Wightiana* W. & A., but when not in flower the two must be very alike, the former probably is more robust.

***Vernonia hyalina* Fischer** [Compositae]: affinis *V. scandenti* DC., foliis subtus lepidotis, bracteis internis hyalinis, achaeniis 5-costatis differt.

Climber; branchlets striate, brown-mealy between the striae. *Leaves* ovate, acuminate, base cuneate, slightly inequilateral, dark-brown above when dry and glabrous, beneath paler, shortly pubescent on the nerves and between them covered with minute whitish or translucent, orbicular scales, 7-8.5 cm. long, 2.5-3.7 cm. wide, margins minutely, irregularly denticulate, primary nerves 5-6 pairs, sometimes forked near the midrib, ultimate reticulations fine. *Petiole* slender, slightly widened at the base, brown-puberulous, 0.6-1 cm. long. *Inflorescence* terminal, corymbose, about 1 dm. in diam., capitula numerous, about 1 cm. in diam.; rhachis and peduncles striate, brown-puberulous, the peduncles bearing a linear, brown puberulous bract about 5 mm. long near the middle. *Involucral bracts* in 4 series, ligulate, obtuse or apiculate, more or less crose at the apex, 2-4.5 mm. long, increasing in length inwards, outermost hairy without, inwards the hairiness tending to be confined to the midrib and apex, the rest of the bract becoming chaffy with hyaline margins. *Receptacle* convex, naked, papillose. *Flowers* all tubular, about 6 mm. long. *Pappus* of about 35 equal, minute, ascendingly-barbellate hairs 5 mm. long. *Corolla* very narrowly funnel-shaped, about 4.5 mm. long, sparsely hairy, lobes erect, linear-lanceolate, acute, 1.3 mm. long, margins thickened, the thickening of adjacent lobes merging into 5 ribs that run down to the slightly swollen base of the corolla-tube. *Stamens* very slightly exserted; filaments filiform, 1.5 mm. long; anthers narrowly linear, 1 mm. long, apex acute, basal lobes very short, subacute. *Ovary* narrowly linear-clavate, sparsely hairy, 5-ribbed, 1.5 mm.

long; stigmas subulate, shortly hairy without, 1-1.3 mm. long. *Achene* strongly 5-ribbed, sparsely hairy, about 1.5 mm. long.

Maymyo, One Tree Hill, 3700 ft., June, C. E. Parkinson 1164.

Vernonia tavoyana Fischer [Compositae]; a *V. scandenti* DC., foliis angustioribus, corollis glandulosis, acheniis teretibus differt.

A twining *shrub*; branchlets brown, with scattered, corky lenticels, minutely verrucose; flowering twigs terete, smooth, brown-pubescent. *Leaves* narrowly lanceolate, acuminate, tapering to the base, 8-13 cm. long, 2.8-4 cm. wide, glabrous and pitted above, with short, scattered hairs below, margins shallowly and distantly crenate with minute teeth at the indentures, primary nerves about 7, arched and anastomosing. *Inflorescence* in terminal, leafy panicles of capitula; rhachis and peduncles terete, brown-pubescent, often with reduced leaves below the lowest capitulum of the divisions and 1-4 linear, brown-pubescent bracts on the peduncles. *Capitula* many-flowered, 1.2-1.5 cm. long. *Involucral bracts* in 4 rows, 2-9 mm. long, increasing in length inwards, ciliate, outermost ovate, acute, hairy outside, innermost elliptic-lanceolate, obtuse at both ends, hairy only at the apex outside and somewhat chaffy below. *Receptacle* naked. *Pappus* of many minutely, ascendingly barbellate equal hairs about 9 mm. long, yellowish when dry. *Corolla* cylindric, abruptly but narrowly expanded above the middle, 9 mm. long, with scattered, globose white glands, lobes linear-lanceolate, sub-acute, reflexed, 3 mm. long. *Stamens* glabrous, 2 mm. long; anthers linear, acute with rounded bases, 5 mm. long; stigmas rather thick, 4.5-5 mm. long, minutely pubescent without. *Achenes* brown, linear-oblong, very slightly enlarged upwards, slightly expanded at the base, truncate at both ends, terete or obscurely ribbed, about 2.5 mm. long, grey-hairy.

Tavoy, Nwalabo, 3150 ft., Dec., R. N. Parker 2306. "An extensive twining shrub, growing with grass and shrubs."

Diospyros Wallichii King & Gamble [Ebenaceae].

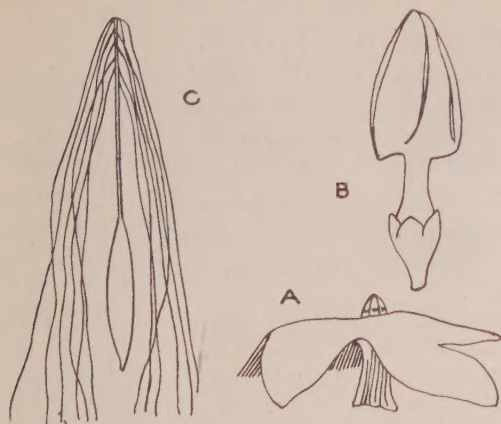
Hitherto reported only from Siam and the Malay Peninsula.

Mergui, Letpanthaung, Dec., R. N. Parker 2337.

Vallaris arborea Fischer [Apocynaceae]; affinis *V. Maingayo* Hook f., foliis majoribus, floribus pluribus et majoribus, disco annulare differt.

Tree 40 feet high; twigs thick, 2-keeled by the decurrent petioles, brown, striate, lenticelled, grey-puberulous. *Leaves* opposite, pairs often unequal, rigidly chartaceous, oblong-lanceolate, acute or shortly acuminate, base acute, often slightly inequilateral, 10-35 cm. long, 4-11 cm. wide, entire, glabrous, dark-brown when dry and shining above, paler and softly grey-puberulous below, midrib channelled above, prominent below, primary nerves distant, 5-13 pairs, secondary nerves distant, irregular reticulations obscure; petioles channelled above, grey-puberulous, 1-1.5 cm. long. *Inflorescence* in axillary racemes much shorter than the leaves; peduncles about as long as the petioles, with the stout rhachis

grey-puberulous; bracts and bracteoles small, deciduous. *Flowers* few to many, fascicled, pedicelled, 2.5-3 cm. in diam. *Pedicels* slender in flower, stout in fruit, grey-puberulous, up to 2 cm. long.



Vallaris arborea Fischer. A. expanded corolla; B. bud; C. seed
(All about nat. size.)

Calyx fleshy, 5-partite almost to the base, 4-5 mm. long, lobes suborbicular, rounded, imbricate, each with 2-3 small, triangular-ovate, acute or apiculate glands at the base within, grey-puberulous without, glabrous within. *Corolla* fleshy hypocrateriform, yellowish-white, tube cylindric, slightly swollen at the base, about 1 cm. long, 2-3 mm. in diam. above the swelling, glabrous without and in the lower half within, densely white-hairy inside on the upper half, lobes 5, spreading, overlapping to the right in bud, broadly ovate to ovate-lanceolate, subacute, 1.5-1.7 cm. long, grey- or brown-puberulous without on the part exposed in bud, more or less grey- or brown-puberulous all over with a few brownish bristles at the base within. *Anthers* 5, sessile on the mouth of the corolla-tube, exserted, conniving in a cone round the stigma, about 4 mm. long, narrowly sagittate, acuminate, base with 2 short empty subulate spurs, hairy with grey bristles without with a large reniform gland at the base without. *Disk* a fleshy, sub 5-partite, lobulate ring nearly as long as the ovary. *Ovary* of 2 separate, hemispheric carpels about 1 mm. in diam., greyish-brown setose; styles 2, separate below, united above, filiform, glabrous; stigma swollen. *Fruit* of 2 divergent, linear-fusiform, compressed, slightly falcate follicles about 18 cm. long, 1.1 cm. wide and 0.6 cm. deep, brown and striate when dry, glabrous. *Seeds* many, very narrowly fusiform, flattened, with a long filiform, fragile beak, finely acuminate below, 5-5.5 cm. long (including the beak), pale-brown, glabrous, striate, the apical portion of the beak furnished with a thin coma of fine silky white hairs longer than the whole seed.

South Tenasserim, Ngawun chaung forests, 300 ft., Jan., C. E. Parkinson 1632.

Vernacular name : *Non Kai Tong* (Shan).

XII.—MISCELLANEOUS NOTES.

We note with pleasure, in the recent New Year's Honours List, the following appointments to Companionships of the Most Eminent Order of the Indian Empire, Mr. R. D. ANSTEAD, Director of Agriculture, Madras, and Mr. DAVID MILNE, Director of Agriculture, Punjab.

CURTIS GATES LLOYD.—By the death of Dr. C. G. Lloyd at Cincinnati on November 11th, 1926, Kew has lost a frequent and welcome visitor.

Dr. Lloyd was born in 1859, and, according to the few biographical details which he himself has published, was interested in the study of plants from his boyhood. It was not until he was nearly 40 years of age that he took up mycology, which thenceforth became his sole study. His interest was first aroused by A. P. Morgan, and he received much assistance from such men as Ellis, Bresadola and Patouillard. When in 1905 he was set free from the obligations of a business career, he began to travel extensively, and set out to study the existing type specimens of the larger fungi. He became a frequent visitor at all the larger herbaria of Europe, and his fortunate possession of means and leisure thus enabled him to acquire a knowledge of existing mycological collections which was unique. Had it been backed by a scientific training he might have gone far. In his earlier days he was an energetic collector, both at home and abroad, while in later years he had developed an extensive correspondence with numerous collectors in different parts of the world, so that he had gradually amassed a valuable collection of the larger *Basidiomycetes* and *Pyrenomycetes*. This collection is housed in a small museum at Cincinnati, and it is to be hoped that provision has been made for the proper care of the specimens and for rendering them available for students. A similar building contains the Lloyd Library, founded by Dr. Lloyd and his two brothers, John Uri and Nelson Ashley Lloyd. The Library contains over 52,000 volumes, mainly on materia medica and mycology, and has been endowed, so that it will be continued after the decease of the founders.

The Lloyd Library published several series of bulletins, of which Dr. C. G. Lloyd's own special publication, "Mycological Notes" is best known to botanists. This work began in 1898, and continued till No. 10 of Vol. 7 in 1925. It is of value chiefly for its excellent and well-reproduced photographs of fungi. Dr. Lloyd was an expert photographer, and no doubt did much to popularise the subject by his numerous illustrations of typical and interesting species.

Lloyd was a man of strong personality. He was intolerant

of work which to him seemed careless or superficial and he held extreme views as to what he dubbed the "advertising" system, namely the citation of authorities for names. His own early work was careful and reliable, but in later years he was less accurate, partly through his having attempted too much and partly through failing health. The latter misfortune no doubt accounted also for an element of bitterness which crept into some of his later publications; it was absent entirely from the good-natured pleasantry to which readers of his earlier work were accustomed.

To those who had most to do with him in his work Lloyd's chief characteristic was that of intense sincerity. He spared no time or trouble in examining the original specimens and older literature for the names of his fungi, and derived more satisfaction from the correct recognition of an old species than from the discovery of a dozen new ones. This trait also was apt to be carried to extremes, and like all extremists he sometimes fell into inconsistencies and absurdities.

He was very appreciative of assistance afforded him, and generous in return. For Kew he apparently had always a warm affection, and the Herbarium is indebted to him for many valuable specimens, and latterly for help given by his clerical assistant, whom he freely loaned during his absence.

In a wider sphere he has rendered valuable services to science by the conservation of four tracts of land in the United States, including an area of virgin forest near his native village of Crittenden, Kentucky, and the well-known McLean swamp near Cornell University. All these he placed in the keeping of a board of trustees for the benefit of the public.

In June last the University of Cincinnati recognised his services to science by granting him the honorary degree of Doctor of Science.

Diseases of Citrus.*—A useful addition to special monographs such as Petch's "Diseases of the Tea Bush", and "Diseases and Pests of the Rubber Tree", is the present volume, which deals with Citrus diseases occurring in all parts of the world where the economic species of Citrus are grown. The first part of the book gives general information as to the species and varieties of Citrus grown, the types of citrus diseases, their geographical distribution, and conditions affecting their incidence, cultural operations in relation to disease, and principles of disease control and prevention.

The second part of the book deals in detail with the various diseases, including effects of environment and nutrition as well as those of parasitic organisms. This portion is divided into 3 sections, namely (1) diseases of root and trunk, (2) diseases of branches, twigs and leaves and (3) fruit diseases, including problems of decay and deterioration in marketing. Each section is provided

* "Citrus Diseases and their Control." Howard S. Fawcett. With sections on Oriental Citrus diseases by H. Atherton Lee. Pp. 582+xii, 205 figs., incl. 15 col. pl. McGraw-Hill Book Co. Inc., New York, 1926, price 20s.

with a key based on symptoms, similar to the keys in Cunningham's "Fungous Diseases of Fruit Trees", a feature which should be particularly useful to growers. The book is illustrated by numerous photographs and line drawings, and contains 15 coloured plates illustrating some of the principal diseases. A good bibliography and index add to its value as an up-to-date summary of all the information available on the problems encountered in citrus cultivation.

E. M. W.

The Aspergilli.*—The Aspergilli and their allies are only too familiar to everyone as the "green moulds" which attack foodstuffs, fabrics, leather, etc., under damp conditions. To the systematic mycologist they have always been a cause of much tribulation, as the multiplicity of species (often imperfectly described), their powers of adaptation to varying conditions, and their frequent occurrence in mixed growth, renders their determination by ordinary herbarium methods almost impossible. Dr. Thom has been engaged for over 20 years in the study of the moulds which occur in all stages of food handling, and his experience with this particular group has now been put together in a volume which will be welcomed by technical and systematic mycologists alike.

The book is described by the authors as "frankly biological and primarily taxonomic." It opens with a brief historical sketch and notes as to the characters of the various genera in question. Following this is a chapter on the morphology of the group, a discussion of the basis of description and the difficulties encountered in the identification of any given form, and a description of culture methods.

The authors have not attempted to cite every reference to Aspergilli in the voluminous literature on physiological, biochemical and medical studies of fungi, but summaries of the results of many such investigations are given in three chapters headed respectively "Physiological and Biochemical Studies", "Enzymic and Fermentative Activities of Aspergilli", "Aspergilli and Animal Disease".

The remainder of the book, about two-thirds, is occupied by a critical taxonomic survey of all known species, with keys to groups and to species within the groups. This part of the work is based on the authors' own cultural studies, together with a careful study of all available literature, not only for original descriptions, but also for any information from investigations in widely separate fields which would provide a basis for identification and description. Last, but not least, there is included a full and representative citation of references to literature, and a good general index.

E. M. W.

* "The Aspergilli," by Charles Thom and Margaret B. Church. Pp. ix + 272, 4 pl., 14 text fig. London: Bailliere, Tindall & Cox, 1926, price £1 2s. 6d.

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